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THE

WORKS

OF

FRANCIS BACON.

VOL. III.

Facsimile

OF

THE TITLEPAGE OF THE MANUSCRIPT

OF THE

VALERIUS TERMINUS.

See pp. 205. and 213.

Fac-simile of the Title page of the Original M.S. (Harl. MSS. 6463.)
See Note at the end of the Preface.

Valerius Terminus

of the Interpretation of Nature
with the Annotations of

Hermes Stella.

A few fragm^ts of ye first boote, v^l.

1 The first chapter entier, ~~touchn~~ Of ~~ye endes and limites of knowledge~~

2 A portion of the xj^e chapter ~~Of the Scale~~

3 A small portion of the ix^e chapter ~~being an Inducem^t to ye Inventorye~~

4 A small portion of the x^e chapter ~~being the p^r face to ye Inventorye~~

5. A small portion of the vi^e chapter ~~being a preface to ye inward Elenches of the mynd~~

~~Of the Interpretacon~~

6. A small portion of the iiij^th chapter
~~of the impedimts of knowledg in generall~~

7th A small portion of the vth chapter ~~of ye~~
~~diversion of coyttes~~

8 The vj^th chapter Entire ~~of~~

9 A portion of the vij^th chapter

10 The viij^th chapter Entire

11 Another portion of the ix^th chapter

12 The Abridgm^t of the 12. 13. 14. 15. 16. 17.
18. 19. 21. 22. 25. 26th chapters
of ye first booke

13. The first chapter of ~~the~~ a booke of
the same argum^t wrytten in Latine
and destined ~~for~~ to be ~~traditionary~~ separate and
not publike.

None of ye Annotations of Stella
are sett down in these fragments.

Philosophy.

Fac-simile of the writing on the Cover.

Rp. 1^r. 26. ♒. 1603. 8. B. 45^r. x^s.

Libri dimidiu est, pag^a 34. —

Pagellaru numeri veri.

THE

WORKS

OF

FRANCIS BACON,

BARON OF VERULAM, VISCOUNT ST. ALBAN,

AND

LORD HIGH CHANCELLOR OF ENGLAND.

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CONTENTS

OF

THE THIRD VOLUME.

PHILOSOPHICAL WORKS.

PART II.

WORKS ON SUBJECTS CONNECTED WITH THE INSTAURATIO, BUT NOT MEANT TO BE INCLUDED IN IT.

	Page
Preface to Part II.	3
Cogitationes de Natura Rerum	11
Preface to De Fluxu et Refluxu Maris, by Robert Leslie Ellis	39
De Fluxu et Refluxu Maris	47
Preface to De Principiis atque Originibus secundum Fabulas Cupidinis et Cœli, by Robert Leslie Ellis	65
De Principiis atque Originibus, etc.	79
New Atlantis	119
Magnalia Naturæ	167

PART III.

WORKS ORIGINALLY DESIGNED FOR PARTS OF THE INSTAURATIO MAGNA, BUT SUPERSEDED OR ABANDONED.

Preface to Part III.	171
Cogitationes de Scientia Humana	177

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Page

PREFACE to VALERIUS TERMINUS, by ROBERT LESLIE ELLIS - 199
VALERIUS TERMINUS - - - - - - 215
ADVANCEMENT OF LEARNING, BOOK I. - - - 253
„ „ BOOK II. - - - 321
FILUM LABYRINTHI - - - - - - 493
DE INTERPRETATIONE NATURÆ PROŒMIUM - - - 505
TEMPORIS PARTUS MASCULUS - - - - 521
PARTIS INSTAURATIONIS SECUNDÆ DELINEATIO ET ARGUMENTUM 541
REDARGUTIO PHILOSOPHIARUM - - - - 557
COGITATA ET VISA DE INTERPRETATIONE NATURÆ - - 587
INQUISITIO LEGITIMA DE MOTU - - - - 621
CALOR ET FRIGUS - - - - - 641
HISTORIA SONI ET AUDITUS - - - - - 653
PHÆNOMENA UNIVERSI - - - - - 681
PREFACE to DESCRIPTIO GLOBI INTELLECTUALIS, by ROBERT LESLIE ELLIS - - - - - - 715
DESCRIPTIO GLOBI INTELLECTUALIS - - - - 727
THEMA CŒLI - - - - - - 769
DE INTERPRETATIONE NATURÆ SENTENTIÆ XII. - - 780
APHORISMI ET CONSILIA - - - - - 789
PHYSIOLOGICAL AND MEDICAL REMAINS - - - 795

TO THE BINDER.

The Facsimile to face the back of the Fly-title.

PHILOSOPHICAL WORKS.

PART II.

WORKS ON SUBJECTS CONNECTED WITH THE INSTAURATIO MAGNA,

BUT NOT MEANT TO BE INCLUDED IN IT;

ARRANGED

ACCORDING TO THE ORDER IN WHICH THEY WERE WRITTEN.

Ista enim nos tanquam in limine Historiæ Naturalis stantes prospicimus, quæ quanto magis quis se immerserit in Historiam Naturalem tanto fortasse probabit magis. Attamen testamur iterum nos hic teneri nolle. In his enim, ut in aliis, certi viæ nostræ sumus, certi sedis nostræ non sumus. — *Thema Cœli*, 1612.

PREFACE.

ALL the works except one which belong to this part, and several of the most interesting among those which follow in the next, were published by Isaac Gruter in 1653; and since in explaining the arrangement which I have adopted I shall often have to refer to the volume in which they first appeared, it will be well to give a particular account of it at once.

Bacon, in his last will, — after bequeathing his collection of speeches and letters to Bishop Williams and Sir Humphrey May, as being privy councillors, — commended the rest of his papers to the care of Sir John Constable and Mr. Bosvile. "Also I desire my executors, especially my brother Constable, and also Mr. Bosvile, presently after my decease, to take into their hands all my papers whatsoever, which are either in cabinets, boxes, or presses, and them to seal up till they may at their leisure peruse them."

What care, or whether any, was presently taken of these papers, I cannot learn. But it is probable that for fourteen months after Bacon's death, they remained locked up;—for so long it was before any one had authority to act; the executors named in the will refusing or delaying to assume their office, and letters of administration being granted on the 13th of July, 1627, to Sir Robert Rich and Mr. Thomas Meautys, two of the creditors;—and that then, or not long after, they were placed in the hands of Mr. Bosvile. This Mr. Bosvile, better known as Sir William Boswell, was sent, soon after Bacon's death, to the Hague; where he resided for several years as agent with the States of the United Provinces. He was knighted on the 18th of May, 1633, and died I believe in 1647. Whether all Bacon's remaining manuscripts were sent to him, or only a portion of them, is not known. What we know is that, among those

which were sent, there were many philosophical pieces written in Latin; that he consulted Isaac Gruter about them; and that the result was a 12mo volume printed by Elzevir at Amsterdam in the year 1653, entitled *Francisci Baconi de Verulamio Scripta in Naturali et Universali Philosophiâ*, and containing these pieces following:—

1. A Prayer, headed *Temporis Partus Masculus, sive Instauratio magna imperii humani in universum.* The same in substance, and almost the same in expression, as the prayer which is introduced towards the end of the Preface to the *Instauratio* (Vol. I. p. 131.): placed here by itself on the blank side of the title-leaf, as if it were a motto to the volume — an office for which the heading makes it altogether inappropriate.
2. *Cogitata et Visa;* to which is added a Latin translation of Sir Thomas Bodley's letter to Bacon concerning that work. (p. 62.)
3. *Descriptio Globi Intellectualis.* (p. 75.)
4. *Thema Cœli.* (p. 154.)
5. *De Fluxu et Refluxu Maris.* (p. 178.)
6. *De Principiis atque Originibus secundum Fabulas Cupidinis et Cœli, &c.* (p. 208.)

These are all printed as separate pieces; each carrying its own title along the top of its own pages.

Then follow, under a general running title of *Impetus Philosophici:*—

7. *Indicia Vera de Interpretatione Naturæ.* (p. 285.) Merely the Præfatio to the *Novum Organum*, already printed in the first volume of this edition, p. 151.
8. *Partis Instaurationis Secundæ Delineatio et Argumentum.* (p. 293.) Printed as if it were a sequel to the last, the two forming one piece; which originally perhaps they did.
9. *Phænomena Universi, sive Historia Naturalis ad condendam Philosophiam.* (p. 323.) A fragment, consisting of a preface intended for the third part of the *Instauratio*, and a rudiment of the *Historia Densi et Rari*, with which it seems that Bacon then intended to begin his collection of histories.

10. *Scala Intellectus, sive Filum Labyrinthi.* (p. 379.) A preface intended for the fourth part of the *Instauratio.* Already printed: Vol. II. p. 687.

11. *Prodromi sive Anticipationes Philosophiæ Secundæ.* (p. 385.) The preface intended for the fifth part of the *Instauratio.* Already printed: Vol. II. p. 690.

12. *Cogitationes de Naturâ Rerum.* (p. 389.) The piece with which in the present edition Part II. begins: infra p. 15.

13. A Preface, entitled *Franciscus Bacon Lectori.* (p. 431.) A first draught probably of the preface to the fourth part of the *Instauratio.*

14. *Filum Labyrinthi, sive Inquisitio legitima de Motu.* (p. 435.) A *skeleton* of an enquiry conducted upon the true method; that is to say, a complete list of the *titles* of the several processes of an investigation into the Form of Motion; followed by some general remarks, which may have been designed for the conclusion of the work which Bacon had in contemplation when he wrote the *Cogitata et Visa,* and intended to set forth the new method in an example.

15. *Franc. Baconi Aphorismi et Consilia, de auxiliis mentis et accensione luminis naturalis.* (p. 448.)

16. *De Interpretatione Naturæ Sententiæ XII.* (p. 451.) This and the preceding are rudiments of the *Novum Organum.*

17. *Tradendi Modus legitimus.* (p. 458.) This consists of two chapters; of which the first is the same as the first chapter of the *Temporis Partus Masculus;* the second another form of the *Redargutio Philosophiarum.* They are printed here (probably by mistake) as if they were a sequel to the *Sententiæ XII.,* with which they do not appear to be connected.

18. *De Interpretatione Naturæ Proœmium.* (p. 479.) This has been intended for a preface to the *Instauratio,* in some of its forms; probably to the *Temporis Partus Masculus.*

19. *Francisci Baconi Topica Inquisitionis de Luce et Lumine.* (p. 485.) Another copy, with a few slight variations, of the paper which has been already printed (Vol. II. p. 317.) from Dr. Rawley's copy.

Of these nineteen pieces, the last thirteen are (as I have said) distinguished from the others by a general running title of *Impetus Philosophici;* the 2nd, 3rd, 4th, 5th, and 6th carrying each its own title on the top of its own pages; and to the whole volume is prefixed an address from Gruter to the reader, which contains all the information that is to be had about it; and which I must transcribe at length, the meaning being in some places so obscure that I can only guess at it.

LECTORI S. ISAACUS GRUTERUS.

QUÆ tibi damus Amice Lector, ad Universalem et Naturalem Philosophiam spectantia, ex Manuscriptis Codicibus, quos accurate recensuerat et varie emendarat author, me amanuense apographa sunt. Sola *Bodlei* epistola, quæ ad examen vocat *Cogitata et Visa*, per me ex Anglico facta Latina est, atque ex opere epistolarum Baconi, quæ tali idiomate circumferuntur, huc translata ob materiæ cognationem. Titulus quem frons libri præfert et totum complectitur opusculi in varias dissertationes secti argumentum, ab ipso *Verulamio* est; quem singulæ exhibent paginæ ex rerum tractatarum serie distinctum, a me, ut minus confunderet quærentem Lectorem indiculi defectus. Quicquid sequitur, ab eo loco cujus inscriptio est in ipso contextu *Indicia vera de interpretatione naturæ* usque ad finem, donavi eo nomine *Impetus Philosophici*, quod ex familiaribus Viri magni colloquiis notassem, cum de istis chartis mecum ageret. Non aliter enim appellare solebat quicquid prioribus per titulos suos separatis connecteretur; ne quis imperfectum statim suspicetur quod defervescente *Impetu* non videt trahere syrma prolixæ tractationis. Omnia autem hæc inedita (nisi quod in editis paucissimis rara exstent quarundam ex his meditationum vestigia) debes, Amice Lector, Nobilissimo *Guil. Boswello*, ad quem ex ipsius Baconi legato pervenerant, cum aliis in politico et morali genere elaboratis, quæ nunc ex dono *τοῦ μακαρίτου* penes me servantur non diu premenda. Boswello inquam, viro nobilitate, prudentia insigni, varia eruditione, humanitate summa, et Oratori olim apud Batavos Anglo; cujus sancta mihi memoria est. Vale et conatibus nostris fave, qui mox plura daturi sumus Baconiana latine versa, maximam partem inedita; et *συλλόγην* adornamus epistolarum quas vir eminentissimus Hugo Grotius scripsit ad Belgas, Germanos, Italos, Suecos, Danos, Gallis exceptis, quas Clarissimus Sarravius Senator Parisiensis edidit. Rogantur itaque in quorum manus hæc inciderint, ut, si quid ejus notæ habent, aut sciunt unde haberi queat, ad typographum transmittant, et significent, cæteris jam collectis aggregandum.

From this statement we learn, first, that all the pieces in the volume are genuine, having been copied by Gruter from original manuscripts, bearing marks of revision and correction by Bacon himself; which manuscripts Gruter received directly from Sir William Boswell, to whom they had come directly from the executors; secondly, that Gruter had then in his possession, "non diu premenda," certain other writings of Bacon's (in Latin apparently) relating to morals and politics, which had come to Boswell along with these; and thirdly, that he had in his hands (but whether derived from the same source or not we cannot say) some pieces written by Bacon in English, and most of them unpublished; and that of these he intended shortly to bring out a Latin translation.

With regard to the works contained in this volume, he seems to have had no further information to give. He has confined himself to the simple office of transcriber. The order in which they are arranged tells nothing either as to nature or date; and the running titles, which are his own device, seem to imply a distinction which, being untrue, can only introduce confusion. By assigning separate running titles to some of the pieces and printing all the rest under one general running title of *Impetus Philosophici*, any one would suppose that he meant to distinguish the first as in some way different in character from the last, — to separate the complete from the incomplete, for instance, the solid from the slight, or the deliberate and final judgment from the experimental and rudimentary essay; — whereas there is in fact no such difference to be found between the two: there being pieces among the last as complete in themselves as any among the first, and pieces among the first as incomplete as any among the last. And if I rightly understand Gruter's own explanation of his motive in making the distinction, — namely, lest the reader should impute the imperfection of the pieces to the fault of the editor instead of the *defervescens impetus* of the author, — it would even seem that he supposed the *Descriptio Globi Intellectualis* and the *De Principiis et Originibus* to be complete; which he could not possibly have done if he had read them with his mind as well as with his eyes.

The fact probably is that the five pieces which stand first under separate titles — the *priora per titulos suos separata* — were found copied out in a book; and that the rest, — "quic-

quid prioribus, &c. *connecteretur*,"—were in separate papers, tied up with it. We happen to know from the *Commentarius Solutus* that in the year 1608 this was the way in which Bacon's manuscripts were actually arranged,—that among his *Libri Compositionum* was one entitled *Scripta in Naturali et Universali Philosophiâ*, and that all his books "had pertaining to them fragments and loose papers of like nature with the books; and those likewise were bundled or laid up with the books." These last I presume it was, or such as these, that were called *Impetus Philosophici* by the "Vir Magnus" (that is, by Boswell, — for Bacon cannot be meant) with whom Gruter conferred about the papers: a description convenient enough for the purpose of distinguishing in a box of manuscripts the loose from the bound-up pieces, but worse than useless when introduced, especially with such imperfect explanation, into a printed book. In the present edition, the plan of which makes it necessary to separate and disperse the several pieces collected by Gruter under this title, the title itself is of course dispensed with. But if the reader wishes to know which of Bacon's posthumous writings he had taken pains to preserve by having them transcribed into a book, and which he had merely kept by him in loose bundles, — a point which it may sometimes be of use to ascertain, — he will find in the table of contents which I have just given all the information on the subject that can be extracted from Gruter's volume.

The duty of *transcriber* Gruter appears to have performed tolerably well; there are but a few places in which the text is manifestly corrupt; but since he has attempted nothing more, it is to be regretted that he has left us without any information as to the fate of the original manuscripts; not one of which, I believe, is known to be in existence. There is not one of them which would not be well worth examining, if it could be found; not only for the correction of the text, but because some interesting questions as to date might possibly be cleared up by help of the interlineations and alterations.

Another question well worth asking is, what became of those moral and political pieces which Gruter had received from Boswell, and had by him in 1653, and intended to publish? I cannot hear that he ever did publish anything answering the description; and unless he transferred them to Dr. Rawley to

be included in the *Opuscula* (1658), which does contain a few things of the kind, they remain to be accounted for.

The unpublished *English* pieces, of which he announces his intention to bring out a Latin translation (an intention which I cannot learn that he ever fulfilled), may have been only copies of those which were published by Dr. Rawley in 1657. These were afterwards translated into Latin by S. J. Arnold, and included (see *Acta Eruditorum*, vol. xiii. anno 1694, p. 400.) in an edition of Bacon's *Opera Omnia* which was published at Leipsic in that year.

In 1695 they were reprinted at Amsterdam by H. Wetstenius in a separate volume; with the title *Francisci Baconi, &c., Opuscula historico-politica, Anglice olim conscripta, et nuper Latinitate donata à Simone Joanne Arnoldo, Ecclesiæ Sonnenbrugensis Inspectore.*

J. S.

COGITATIONES

DE

NATURA RERUM.

PREFACE

TO THE

COGITATIONES DE NATURA RERUM.

THIS piece was printed by Gruter among the *Impetus Philosophici;* from which we may probably conclude that it had not been transcribed into the volume of *Scripta in Naturali et Universali Philosophiâ*[1]: but that is all. There is nothing to determine the date of composition, unless it be the absence of any allusion to the new star in Ophiuchus in the place where the new star in Cassiopeia is mentioned. See note, § x. The value of the argument will be more easily understood by comparing the passage in question with a passage of the same import in a work, obviously later, where both these stars are mentioned together. In both cases the question under discussion is the immutability of the heavens. In the *Cogitationes de Naturâ Rerum,* of which the date is unknown, we find, "... mutationes in regionibus cœlestibus fieri, ex cometis quibusdam satis liquet; iis dico qui certam et constantem configurationem cum stellis fixis servarunt; qualis fuit ille qui in Cassiopeâ nostrâ ætate apparuit." This star in Cassiopeia appeared in 1572. But another of the same kind, and no less remarkable, appeared in September 1604. It is said to have been brighter, when first seen, than Jupiter[2]; and though its brightness diminished afterwards, it was distinctly visible for more than a year. It attracted so much attention as to be made the subject of three lectures of a popular character, given by Galileo to crowded audiences; and it is difficult to believe either that Bacon did not know of it (he being then 44 years

[1] See above, p. 8.

[2] Maestlin, quoted in the Life of Galileo, *Library of Useful Knowledge*, p. 16.

old, and busy at the time with the *Advancement of Learning*, and quite understanding the significance of the phenomenon;) or that, if he did, he could have forgotten to mention it when speaking of the other. Accordingly, in the *Descriptio Globi Intellectualis*, which we know to have been written about the year 1612, the passage which I have just quoted appears in a new form. "Id enim [sc. admirandas in cœlo accidere mutationes atque insolentias] perspicitur in cometis sublimioribus, iis nimirum qui et figuram stellæ induerunt absque comâ, neque solum ex doctrinâ parallaxium supra lunam collocati esse probantur, sed configurationem etiam certam et constantem cum stellis fixis habuerunt, et stationes suas servarunt, neque errones fuerunt; quales ætas nostra *non semel* vidit; primo in Cassiopeâ, *iterum non ita pridem in Ophiucho*."

That when Bacon wrote the tenth *Cogitatio* he *had not heard* of the appearance of this second new star, may be assumed with considerable confidence. The only question is whether such a phenomenon could have been long known to the astronomers of his time, without his hearing of it; of which I can only say that it seems unlikely, and that, in the absence of all evidence to the contrary, the presumption must be that these *Cogitationes* were composed before 1605. That they were composed before the appearance of the new star in Cygnus, cannot be so safely inferred. That star was much less conspicuous; and it is a fact that Galileo himself, treating this very same argument, mentions both the others without making any allusion to it. See Dial. dei Massimi Sistemi, p. 59. ed. Flor. 1842.

The notes to this piece are Mr. Ellis's.

J. S.

COGITATIONES DE NATURA RERUM.

COGITATIO I.

De sectione corporum, continuo, et vacuo.

Doctrina Democriti de atomis aut vera est, aut ad demonstrationem utiliter adhibetur. Non[1] facile enim est naturæ subtilitatem genuinam, et qualis in rebus ipsis invenitur, aut cogitatione complecti aut verbis exprimere, nisi supponatur atomus. Accipitur autem duobus sensibus atomus, non multum inter se diversis. Aut enim accipitur pro corporum sectionis sive fractionis termino ultimo sive portione minima; aut pro corpore quod vacuo caret. Quod ad primum attinet, hæc duo posita tuto et certo statui possunt. Alterum, inveniri in rebus dispertitionem et comminutionem, longe ea quæ sub adspectum cadit subtiliorem. Alterum, eam tamen infinitam non esse, nec perpetuo divisibilem. Si quis enim diligenter attendat, reperiet rerum minutias in corporibus continuatis, eas quæ in corporibus fractis et discontinuatis inveniuntur subtilitate longe vincere. Videmus enim parum croci in aqua infusum et agitatum, puta dolium aquæ ita inficere, ut ab alia aqua pura etiam visu distingui possit. Quæ certe dispertitio croci per aquam, subtilitatem exquisitissimi pulveris superat. Quod manifestum fiet, si tantundem pulveris ligni Brasilii, vel balaustiorum, vel alicujus rei optime coloratæ (quæ tamen croci lentorem ad se in liquoribus aperiendum et incorporandum non habeat) immisceas. Itaque ridiculum erat, atomos pro parvis illis corpusculis quæ sub radiis solis conspiciuntur accipere. Ea enim pulveris instar sunt; atomum autem, ut ipse Democritus aiebat, nemo unquam vidit, aut videre possit. Sed ista rerum dispertitio in odoribus multo magis mirabilem se ostendit. Etenim si parum croci dolium aquæ colore, at parum zibethi cœnaculum amplum odore, imbuere et inficere potest, et subinde

[1] *Nam* in Gruter's copy. — *J. S.*

aliud, et rursus aliud. Neque quisquam sibi fingat, odores, luminis more aut etiam caloris et frigoris, absque communicatione substantiæ diffundi; cum notare possit, odores etiam rebus solidis, lignis, metallis, adhærescere, idque ad tempus non exiguum; posse etiam frictione, lavatione, ab iisdem discuti et purgari. Verum in hisce et similibus, quod processus infinitus non sit, nemo sanus contradixerit; cum intra spatia et limites, et corporum quantitates, hujusmodi dispertitio sive diffusio cohibeatur: ut in exemplis antedictis evidentissimum est. Quod ad secundum sensum atomi attinet, quod vacuum præsupponit, atomumque ex privatione vacui definit; bona et seria diligentia Heronis fuit, quæ[1] vacuum coacervatum negavit, vacuum commistum asseruit.[2] Cum enim perpetuum corporum nexum cerneret, neque inveniri prorsus aut assignari spatium aliquod quod corpore vacet; et multo magis, cum corpora gravia et ponderosa sursum ferri, et naturas suas quoquo modo deponere et violare potius quam divulsionem absolutam a corpore contiguo patiantur, videret; naturam a vacuo majoris notæ, sive coacervato, abhorrere prorsus statuit. Contra, cum eandem corporis materiam contrahi, et coarctari, et rursus aperiri et dilatari perspiceret, et spatia inæqualia, interdum majora interdum minora, occupare et complere; non vidit quomodo hujusmodi ingressus et egressus corporum in locis suis fieri possit, nisi propter vacuum admistum, minus videlicet corpore compresso, plus relaxato. Necesse enim esse, contractionem istam per unum ex his tribus modis fieri; aut eo quem diximus, nempe quod vacuum pro ratione contractionis excludatur; aut quod aliud aliquod corpus prius intermixtum exprimatur; aut quod sit quædam naturalis (qualis qualis ea sit) corporum condensatio et rarefactio. Atque quod ad corporis tenuioris expressionem attinet, ista ratio nullum exitum habere videtur. Nam verum est, spongias, et hujusmodi porosa, expresso aëre contrahi. De aëre ipso autem manifestum est per plurima experimenta, eum[3] spatio notabili contrahi posse. Num ergo et ipsius aëris subtiliorem partem exprimi putandum est? et deinceps hujusmodi partis aliam, et sic in infinitum? Nam adversissimum tali opinioni est, quod quo tenuiora corpora sint, eo majorem contractionem sustineant; cum contra fieri oporteret, si contractio per expressionem partis tenuioris fieret. Atque de illo

[1] So in Gruter's copy. — *J. S.*

[2] See note on *Nov. Org.* II. 48. [Vol. I. p. 347.]

[3] *cum* in Gruter's copy. — *J. S.*

altero modo, corpora scilicet eadem, nec alias mutata, tamen magis et minus in raritate aut densitate recipere, non multum laborandum est. Positivum enim quiddam videtur esse, et ratione surda et inexplicata niti, qualia sunt fere Aristotelis pronuntiata. Restat itaque tertius ille modus, qui vacuum supponit. Quod si illud quis objiciat: durum videri, et fere incredibile, ut vacuum admistum sit, cum corpus ubique reperiatur; is si exempla quæ modo adduximus, aquæ croco, vel aëris odoribus infecti, animo sedatiore consideret, facile perspiciet nullam partem posse assignari aquæ ubi crocus non sit, et tamen manifestum esse ex comparatione croci et aquæ antequam miscerentur, corpus aquæ corpus croci multis numeris excedere. Quod si id in diversis corporibus invenitur, multo magis in corpore et vacuo hoc fieri putandum est. Verum in ea parte, Heronis, utpote hominis mechanici, contemplatio, illa Democriti, philosophi clarissimi, inferior fuit: quod Hero, quia hic apud nos in nostro isto orbe vacuum coacervatum non reperit, ideo illud simpliciter negavit. Nil enim impedit, quominus in regionibus ætheris, ubi proculdubio majores sunt corporum expansiones, etiam vacuum coacervatum sit. In iis autem inquisitionibus et similibus semel monitum sit, ne quis propter tantam naturæ subtilitatem confundatur et diffidat. Cogitet enim et unitates et summas rerum ex æquo supputationi submitti. Tam facile enim quis mille annos dixerit aut cogitarit[1], quam mille momenta; cum tamen anni a multis momentis constituantur. Neque rursus existimet aliquis, hæc potius speculationis curiosæ esse, quam ad opera et usum referri. Videre enim est omnes fere philosophos et alios qui in experientia et rebus particularibus sedulo versati sunt et naturam ad vivum dissecuerunt, in hujusmodi inquisitiones incidere, licet eas feliciter non peragant. Neque alia subest causa potentior et verior, ob quam philosophia quam habemus effectuum sit sterilis, nisi quod verborum et notionum vulgarium subtilitates captavit; naturæ subtilitatem non persecuta est, nec inquirere constituit.

II.

De æqualitate ac inæqualitate Atomorum sive Seminum.

Pythagoræ inventa et placita talia ex majore parte fuere, quæ ad ordinem potius quendam religiosorum fundandum,

[1] *cogitaret* in Gruter's edition.—*J. S.*

quam ad scholam in philosophia aperiendam, accommodata essent; quod et eventus comprobavit. Ea enim disciplina plus in hæresi Manichæorum et superstitione Mahumeti quam apud philosophos valuit et floruit. Opinio tamen ejus, mundum ex numeris constare, eo sensu accipi potest, ut ad naturæ principia penetret. Duplex enim est, atque adeo esse potest, opinio de atomis sive rerum seminibus: una Democriti, quæ atomis inæqualitatem et figuram, et per figuram situm, attribuit; altera fortasse Pythagoræ, quæ eas omnino pares et similes esse asseruit.[1] Qui enim æqualitatem atomis assignat, is omnia in numeris necessario ponit; qui autem reliqua attributa admittit, is naturas primitivas atomorum singularium præter numeros sive rationes coitionum adhibet. Activa autem quæstio quæ huic speculativæ respondet eamque determinare potest, ea est quam etiam Democritus adducit; utrum omnia ex omnibus fieri possint.[2] Quod cum ille a ratione alienum putasset, atomorum diversitatem tenuit. Nobis vero ea quæstio non bene instituta nec quæstionem priorem premere videtur, si de transmutatione immediata corporum intelligatur. Verum utrum etiam per debitos circuitus et mutationes medias universa non transeant, ea demum quæstio legitima est. Dubium enim non est, semina rerum, licet sint paria, postquam se in certas turmas et nodos conjecerint, corporum dissimilium naturam omnino induere, donec eædem turmæ aut nodi dissolvantur; adeo ut compositorum natura et affectus transmutationi immediatæ non minori impedimento ac obici, quam simplicium, esse possit. Verum Democritus in corporum principiis investigandis acutus; in motuum autem principiis examinandis sibi impar et imperitus deprehenditur; quod etiam commune vitium omnium philosophorum fuit. Atque hujus de qua loquimur inquisitionis de prima conditione seminum sive atomorum utilitas, nescimus an non sit omnino maxima; ut quæ sit actus et potentiæ suprema regula, et spei et operum vera moderatrix. Etiam alia inquisitio inde fluit, cujus utilitas complexu minor, sed rebus et operibus propior est. Ea est de separatione et alteratione; hoc est, quid per separa-

[1] It is possible that Bacon may have been led to suggest this view of the Pythagorean philosophy by a passage in Stobæus, *Eclog.* i. 16. It is there said that Ecphantus, a Pythagorean of Syracuse, took as first principles atoms and vacuum. τὰς γὰρ Πυθαγορικὰς μονάδας οὗτος πρῶτος ἀπεφήνατο σωματικάς. But as metaphysical conceptions have, so to speak, a natural tendency to assume a merely physical character, the idea of a parallel between Democritus and Pythagoras may, it is not improbable, have occurred to him independently of this or any similar passage.

[2] See Lucretius, i. 784.

tionem fiat, et quid alia ratione. Familiaris enim est animo humano error, qui etiam a chymistarum philosophia magnum robur et incrementum accepit; ut ea separationi deputentur, quæ alio spectent. Exempli gratia; cum aqua in vaporem transit, facile quis opinetur partem aquæ subtiliorem emitti, crassiorem subsistere; ut in ligno videre est, ubi pars in flamma et fumo evolat, pars in cinere manet. Simile quiddam et in aqua fieri quis putet, licet non tam manifesto. Quamvis enim tota aqua quandoque ebullire et consumi videatur, tamen fæces quasdam ejus, tanquam cinerem, vasi adhærescere posse. Verum et ista ratio cogitationem fallit. Certissimum enim est, totum corpus aquæ in aërem posse mutari, et si quid vasi adhærescat, id non ex delectu et separatione partis crassioris, sed forte ut aliqua pars (licet pari omnino cum ea quæ evolat substantia) situ vas tetigerit, evenire; idque exemplo argenti vivi elucescit, quod totum fit volatile, et rursus totum absque diminutione vel tantilla consistit. Etiam in oleo lampadum et sevo candelarum, totum a pingui fit volatile, nec aliqua fit incineratio; nam fuligo post flammam, non ante flammam, gignitur; et flammæ cadaver, non olei aut sevi sedimentum est. Atque hoc aditum quendam ad Democriti opinionem de diversitate seminum sive atomorum labefactandam præbet. Aditum, inquam, in natura; nam in opinione aditus ille est multo mollior et blandior, quod philosophia vulgaris materiams suam commentitiam ad omnes formas æquam et communem fingit.

III.

De negligentia veterum in inquisitione de Motu et Moventibus rerum Principiis.

Inquisitionem de Natura in Motu contemplando et examinando maxime collocare, ejus est qui opera spectet. Quieta autem rerum principia contemplari aut comminisci, eorum est qui sermones serere et disputationes alere velint. Quieta autem voco principia, quæ docent ex quibus res conflentur et consistant, non autem qua vi et via coalescant. Neque enim ad agendum et potestatem sive operationem humanam amplificandam sufficit, aut magnopere attinet, nosse ex quibus res constent, si modos et vias mutationum et transformationum ignores. Nam sumpto exemplo a mechanicis[1] (a quarum[2]

[1] This word is obviously a wrong reading for *medicis*.

[2] Read *quorum*.

phantasia celebres illæ de principiis rerum inquisitiones fluxisse videntur), an forte qui simplicia theriacam ingredientia novit, is pro certo theriacam componere potest? Aut qui sacchari, vitri, panni, materialia recte descripta apud se habet, num propterea artem quæ ad eorum præparationem et effectionem pertinet tenere videtur? Atque in hujusmodi tamen principiis mortuis investigandis et examinandis hominum speculationes præcipue occupatæ sunt; ac si quis cadaveris naturæ anatomiam inspicere, non naturæ vivæ facultates et virtutes inquirere, sibi proponat et destinet. De moventibus autem rerum principiis sermo fere in transitu habetur; ut omnem admirationem superet, si intueamur quam negligenter et dissolute res omnium maxima et utilissima inquiratur et tractetur. Etenim si cogitationem de iis quæ dicuntur paulisper suscipiamus; num stimulus materiæ per privationem? num efformatio materiæ ad ideam? num aggregatio particularum similium? num agitatio fortuita atomorum in vacuo? num lis et amicitia? num cœli et terræ impressiones reciprocæ? num elementorum commercium per qualitates symbolizantes?[1] num influxus cœlestium? num sympathiæ et antipathiæ rerum? num occultæ et specificæ virtutes et proprietates? num fatum, fortuna, necessitas? num, inquam, hujusmodi generalia, quæ nil aliud sunt quam spectra et simulachra in superficie rerum, veluti in aquis, natantia et ludentia, humanum genus beabunt aut opes humanas efficient auctiores? Ista enim phantasiam implent, vel inflant potius; sed nil prorsus ad operum effectionem, corporum mutationem, aut motuum regimen faciunt. Atque rursus, de motu naturali et violento, de motu ex seipso et aliunde, de terminis motuum, argutari et subtilitates captare; et hæc quoque nil admodum de corpore naturæ stringunt; sed potius in cortice describuntur. Itaque his missis, vel ad populares sermones damnatis et relegatis, illi demum rerum appetitus et inclinationes investigandæ sunt, a quibus ista, quam videmus, tanta effectuum et mutationum varietas in operibus et naturæ et artis conflatur et emergit. Atque tentandum ut naturæ, veluti Proteo, vincula injiciamus. Sunt enim genera motuum recte inventa et discreta, vera Protei vincula. Nam

[1] Those elements are said to symbolize, or to be allied, which have a primary quality in common. Thus air symbolizes with fire, inasmuch as both are hot; and with water, inasmuch as like water it is moist. In the preceding clauses Bacon alludes successively to Aristotle, Plato, Anaxagoras, Democritus, Empedocles, and Parmenides.

prout motuum, id est, incitationum et cohibitionum, stimuli et nodi adhibentur, ad illud sequitur materiæ ipsius conversio et transformatio.

IV.

De divisione vulgari Motus, quod sit inutilis, et minus acuta.

Divisio Motus recepta in philosophia popularis videtur et absque fundamento, ut quæ rem per effectus tantum dividit; atque ad hoc, ut per causas sciamus, nihil conducit. Nam generatio, corruptio, augmentatio, diminutio, alteratio, latio ad locum, nil aliud quam opera et effectus motuum sunt[1]; qui cum ad manifestam rerum mutationem pervenerunt quæ populari notæ subjacet, tum demum hisce nominibus (pingui satis contemplatione) insigniuntur. Neque enim dubitamus quin hoc sibi velint: cum corpora per motum (cujuscunque sit generis) eo usque processerint ut formam novam teneant vel veterem ponant (quod veluti periodus quædam est, et justi spatii confectio), id motum *generationis* et *corruptionis* nominari; sin autem, manente forma, quantitatem tantummodo et dimensionem novam adipiscantur, id motum *augmentationis* et *diminutionis* dici; sin[2], manente etiam mole et claustris sive circumscriptione, tamen qualitate, actionibus, et passionibus mutentur, id motum *alterationis* appellari; sin, manente utique et forma et mole et quantitate, locum et nil aliud mutent, id per motum *lationis* significari. Verum hæc omnia, acutius et diligentius inspicienti, mensura motus sunt, et periodi sive curricula quædam motuum, et veluti pensa; non veræ differentiæ; cum quid factum sit designent, at rationem facti vix innuant. Itaque hujusmodi vocabula docendi gratia sunt necessaria, et dialecticis rationibus accommodata, naturalis autem scientiæ egentissima. Omnes enim isti motus compositi sunt, et decompositi, et multipliciter compositi; cum perite contemplantibus ad simpliciora penetrandum sit. Nam principia, fontes, causæ, et formæ motuum, id est omnigenæ materiæ appetitus et passiones, philosophiæ debentur; ac deinceps motuum

[1] From this enumeration it seems that Bacon was not aware that generation and corruption were not regarded by Aristotle as kinds of motion. But see Arist. *Physic.* v. 1. There are, according to Aristotle, three kinds of κίνησις or motion, corresponding to the three categories which admit of contrariety; namely, πόσον, ποιόν, and ποῦ. To the first corresponds increment or decrement; to the second, alteration; and to the third, local motion.

[2] [*sic* in Gruter's edition; which,] as M. Bouillet has observed, ought to be *sin*.

impressiones sive impulsiones; fræna et reluctationes; viæ et obstructiones; alternationes et mixturæ; circuitus et catenæ; denique universus motuum processus. Neque enim disputationes animosæ, aut sermones probabiles, aut contemplationes vagæ, aut denique placita speciosa, multum juvant. Sed id agendum, ut modis debitis, et ministerio naturæ convenienti, motum quemcunque in materia susceptibili excitare, cohibere, intendere, remittere, multiplicare, ac sopire et sistere possimus; atque inde corporum conservationes, mutationes, et transformationes præstare. Maxime autem ii motus sunt inquirendi, qui simplices, primitivi, et fundamentales sunt, ex quibus reliqui conflantur. Certissimum enim est, quanto simpliciores motus invenientur, tanto magis humanam potestatem amplificari, et a specialibus et præparatis materiis liberari, et in nova opera invalescere. Et certe quemadmodum verba sive vocabula omnium linguarum, immensa varietate, e paucis literis simplicibus componuntur; pari ratione universæ rerum actiones et virtutes a paucis motuum simplicium naturis et originibus constituuntur. Turpe autem fuerit hominibus, propriæ vocis tintinnabula tam accurate explorasse, ad naturæ autem vocem tam illiteratos esse; et more prisci seculi (antequam literæ inventæ essent) sonos tantum compositos et voces dignoscere, elementa et literas non distinguere.

V.[1]

De Quanto Materiæ certo, et quod[2] *mutatio fiat absque interitu.*

Omnia mutari, et nil vere interire, ac summam materiæ prorsus eandem manere, satis constat. Atque ut omnipotentia Dei opus erat, ut aliquid crearetur e nihilo; ita et similis omnipotentia requiritur, ut aliquid redigatur in nihilum. Id sive per destitutionem virtutis conservatricis sive per actum dissolutionis fiat, nihil ad rem: tantum necesse est, ut decretum intercedat Creatoris. Hoc posito, ne cogitatio abstrahatur aut materia aliqua fictitia intelligatur, etiam illud significamus; eam a nobis introduci materiam, atque ea natura investitam, ut

[1] A manuscript in the British Museum (Add. 4258.), — for a full account of which see my Preface to the *Cogitationes de Scientia Humanâ*, the first piece in the third Part, — contains the fifth, sixth, seventh, and tenth of these Cogitationes. It has a few different readings, which I will point out here, though they are almost all mistakes. — *J. S.*

[2] *quæ* in MS.

vere dici possit, huic corpori plus materiæ adesse, illi autem (licet eandem mensuram expleant) minus. Exempli gratia, plumbo plus, aquæ minus, aëri multo minus: neque hoc solum indefinite et ratione incerta et surda, sed præcise; adeo ut calculos hæc res pati possit, veluti plus duplo, triplo, et similiter. Itaque si quis dicat aërem ex aqua fieri posse aut rursus aquam ex aëre, audiam; si vero dicat similem mensuram aquæ in similem mensuram aëris verti posse, non audiam; idem enim est ac si dixisset aliquid posse redigi in nihilum. Similiter e converso, si dicat datam mensuram aëris (exempli gratia vesicam contenti certi aëris plenam) in similem mensuram aquæ verti posse, idem est ac si dicat aliquid fieri posse ex nihilo. Ex his itaque positis, tria præcepta sive consilia ad usum derivare jam visum est; ut homines peritius, et propter peritiam felicius, cum natura negotientur. Primum hujusmodi est, ut homines frequenter naturam de rationibus suis reddendis interpellent; hoc est, cum corpus aliquod quod prius sensui manifestum erat aufugisse et disparuisse videant, ut non prius rationes admittant [1] aut liquident, quam demonstratum eis fuerit quo tandem corpus illud migraverit, et ad quæ receptum sit. Hoc, ut nunc sunt res, negligentissime fit, et contemplatio plerumque cum aspectu desinit; adeo ut flammæ, rei vulgatissimæ, receptum homines non norint; quandoquidem eam in corpus aëris mutari falsissimum sit. Secundum hujusmodi, ut cum homines [2] considerent necessitatem naturæ prorsus adamantinam quæ materiæ inest, ut se sustentet nec in nihilum cedat aut solvatur, illi rursus nullum genus vexationis et agitationis materiæ prætermittant, si ultimas ejus operationes et obstinationes detegere atque educere velint. Atque hoc consilium non admodum artificiosum certe videri possit; quis negat? sed utile tamen quiddam videtur, neque nihil in eo est. Veruntamen, si placet, etiam nunc parum observationis huic rei adspergamus. Itaque sic habeto.[3] Maximum certe homini, sive operanti sive experienti, impedimentum occurrit, quod materiæ massam certam absque diminutione aut accessione servare, et premere et subigere vix licet; sed separatione facta ultima vis eluditur. Separatio autem duplex intervenit, aut quod pars materiæ evolet, ut in decoctione: aut saltem quod secessio fit, ut in flore lactis. Intentio itaque mutationis

[1] *non admittant* in MS. [2] *homines cum* in MS. [3] *habete* in MS.

corporum profundæ et intimæ non alia est, quam si materia omnino debitis modis vexetur; sed tamen istæ duæ separationes nihilominus interim prohibeantur. Tum enim materia vere constringitur, ubi fugæ omnis via intercipitur. Tertium denique hujusmodi, ut homines cum corporum alterationes in eadem materiæ massa, neque aucta neque diminuta, fieri videant, primum eo errore phantasiam liberent, qui alte hæret; alterationem nempe tantummodo per separationem fieri; deinde ut sedulo et perite distinguere incipiant de alterationibus, quando ad separationem referri debeant; quando ad disordinationem tantum, et variam positionem partium absque alia separatione; quando ad utramque. Neque enim (credo) cum pyrum immaturum et acerbum manibus[1] fortius attrectamus, contundimus, et subigimus, unde illud dulcedinem acquirit; aut cum succinum vel gemma in pulverem subtilissimum redacta colorem deponunt; materiæ pars notabilis deperditur; sed tantum partes corporis in nova positione constituuntur. Restat ut errorem quendam ex opinionibus hominum evellamus, cujus ea vis est, ut si fides ei adhibeatur[2], aliqua ex his quæ diximus pro desperatis haberi possint. Vulgaris enim opinio est, rerum spiritus, cum ad intensiorem quendam gradum tenuitatis per calorem evecti[3] sunt, etiam in vasis solidissimis (puta argenti, vitri), per occultos eorundem poros et meatus evolare[4]; quod minus verum est. Neque enim aër aut spiritus, licet accedente calore rarefactus, non flamma ipsa, tam libenter se comminuit, ut per hujusmodi poros exitum sibi quærere aut facere sustineat. Verum ut nec aqua per rimam valde parvam, ita nec aër per hujusmodi poros effluit. Nam ut aër aqua longe tenuior, ita et tales pori rimis conspicuis longe subtiliores sunt; neque opus haberet[5] sub vase operto suffocari, si hujusmodi perspirationes illi ullo modo præsto essent aut competerent. Exemplum autem quod adducunt miserum est, vel potius miserandum; ut sunt pleræque contemplationes vulgaris philosophiæ, cum ad particularia ventum est.[6] Aiunt enim, si charta inflammata in poculum mittatur, et subito os poculi super vas aquæ convertatur, aquam sursum trahi; propterea quod postquam flamma, et aër per flammam rarefactus, quæ spatii aliquantum impleverant, per poros vasis exhalaverint, restare ut corpus aliquod succedat. Idem in

[1] *per manus* in MS.
[2] *exhibeatur* in MS.
[3] *erectæ* in MS.
[4] *evolari* in Gruter's edition.—*J. S.*
[5] *haberet flamma* in MS.
[6] *sit* in MS.

ventosis fieri, quæ carnes trahunt. Atque de successione aquæ vel carnis bene sentiunt; de causa quæ præcedit, imperitissime. Neque enim est aliqua corporis emissio, quæ spatium præbet, sed sola corporis contractio. Corpus enim in quod flamma recidit, longe minus spatium complet, quam flamma antequam exstingueretur. Hinc fit illud inane, quod successionem desiderat. Atque in ventosis hoc evidentissimum est. Nam cum eas fortius trahere volunt, spongia aquæ frigidæ infusa illas tangunt, ut per frigus aër interior condensetur, et se in minus spatium colligat. Itaque demimus certè hominibus eam solicitudinem, ne de spirituum tam facili evolatione laborent: cum et illi spiritus, quos sæpe desiderant, odorum, saporum, similium, non semper[1] extra septa evolent[2], sed intra confundantur[3]; hoc certissimum est.

VI.

De Quiete Apparente, et Consistentia, et Fluore.

Quod quædam quiescere videantur et motu privari, id secundum totum aut integrum recte videtur, secundum partes autem hominum opinionem fallit. Quies enim simplex et absoluta, et in partibus et in toto[4], nulla est; sed quæ esse putatur, per motuum impedimenta, cohibitiones, et æquilibria efficitur. Exempli gratia, cum in vasis[5] in fundo perforatis, quibus hortos irrigamus, aqua (si os vasis obturetur) ex foraminibus illis non effluit, id per motum retrahentem non per naturam quiescentem fieri perspicuum est. Aqua enim tam contendit descendere, quam si actu suo potiatur; sed cum in summitate vasis non sit quod succedat, aqua in imo ab aqua in summo retrahitur et vim patitur. Si quis enim alterum infirmiorem in lucta teneat, ut se movere non possit, atque ille nitatur tamen[6] sedulo, non propterea minor est motus renitentiæ, quia non prævalet, et a motu fortiori ligatur. Hoc autem quod dicimus de falsa quiete, et in rebus innumeris utile cognitu est, et non minimum lucis præbet in inquisitione naturæ solidi et[7] liquidi, sive consistentiæ et fluoris. Solida enim videntur in positione sua manere et quiescere, liquida autem moveri et confundi. Neque enim columna ex

[1] *semper* om. MS. [2] *evolant* in MS. [3] *confunduntur* in MS.
[4] *et in partibus et in toto* om. MS. [5] *vasibus* in MS.
[6] So the MS. In Gruter's edit. *tamen* comes after *propterea*. [7] *vel* in MS.

aqua, aut alia effigies exstrui potest, ut de[1] ligno vel lapide. Itaque in promptu est opinari, partes aquæ superiores contendere (motu, quem appellant, naturali) ut defluant: partes autem ligni non item. Atqui hoc verum non est; cum idem insit motus partibus ligni quæ in summo collocantur, ut deorsum ferantur, qui aquæ; idque in actum perduceretur, nisi ligaretur et retraheretur iste motus a motu potiore. Is autem est certe appetitus continuitatis, sive separationis fuga; quæ et ipsa tam aquæ quam ligno competit, sed in ligno est motu gravitatis fortior, in aqua debilior. Nam quod ex hujusmodi motu etiam quæ liquida sunt participent, id manifestum est. Videmus enim in bullis aquæ, ad separationem evitandam, aquam se in pelliculas conjicere, in hemisphærii formam confictas. Videmus etiam in stillicidiis, aquam ut aquæ continuetur, in filum exile se producere et attenuare, quoad sequens aqua suppetat; sin autem deficiat aqua ad continuationem, tum se in guttas rotundas recipere, quarum diameter filo illo priore sit multo major.[2] Simili modo videmus, aquam comminutionem magis exquisitam ægre pati, cum ex foraminibus et rimis (si subtiliores sint) naturali suo pondere absque concussione non effluat. Quare constat appetitum continuitatis etiam liquidis inesse, sed debilem. At contra in rebus solidis viget, et motui naturali sive gravitati prædominatur. Si quis enim existimet, in columna ligni vel lapidis superiores partes non diffluere cupere, sed se in eodem plane statu sustinere; is facile se corriget, si consideret columnam, sive similia, si altitudo ejus ad latitudinem basis non sit proportionata, sed modum excedat, stare non posse, sed devexo pondere ferri; adeo ut structuris prælatis necesse sit ut ad pyramidis formam inclinent, et sint versus summitatem angustiores. Qualis autem sit ea natura quæ appetitum istum continuitatis intendat aut remittat, non facile inquirenti occurret. Illud fortasse suggeretur, partes solidorum esse magis densas et compactas; liquidorum[3] magis raras et solutas; aut liquidis subesse spiritum, quod fluoris sit principium, qui in solidis desit; et hujusmodi. Sed neutrum horum veritati consonum est. Manifestum enim est, nivem et ceram, quæ secari et fingi et impressiones recipere possunt, argento vivo aut plumbo liquefacto longe esse rariora, ut in ratione ponderum

[1] *et* in MS. [2] *diametrum* and *majus* in MS. [3] *liquorum* in MS.

evincitur. Quod si quis adhuc insistat, fieri posse ut nix aut cera, licet sit (in toto) argento vivo rarior, tamen habere possit partes magis clausas et compactas; verum quia sit corpus spongiosum et cava multa et aërem recipiat, ideo in summa effici leviorem; ut in pumice fit, qui cum pro ratione molis sit fortasse ligno levior, tamen si utrumque in pulverem redigatur, pulverem pumicis pulvere ligni futurum graviorem, quia cavitates illæ non amplius adsint; hæc bene notata et objecta sunt. Sed quid ad nivem et ceram colliquatam dicent, ubi jam cavitates expletæ sunt; vel quid ad gummi corpora, mastichen, et similia, quæ cavitates istas manifestas non habent, et tamen sunt pluribus liquoribus leviora? Quod autem de spiritu afferunt, per cujus vim et impetum res fluant; id certe primo intuitu probabile est, et notionibus communibus familiare; reipsa autem durius est et magis erroneum; cum veræ rationi non solum non innitatur, sed fere opponatur. Spiritus enim ille, quem dicunt, revera (quod mirum fortasse dictu) consistentiam inducit, non fluorem. Quod et optime in instantia nivis cernitur, quæ cum ex aqua et aëre compositum corpus sit, cumque et aqua et aër seorsim fluant, in mixtura tamen consistentiam adipiscitur. Quod si quis objiciat, id evenire posse ex condensatione aqueæ partis per frigus, et non ab interpositione aëris; is se corriget, si animadvertat etiam spumam corpus simile nivi esse, quod tamen a frigore nullo modo condensetur. Sin adhuc urgeat, et in spuma præcedere[1] condensationem, non a frigore, sed tamen ab agitatione et percussione; is pueros consulat, qui ex levi aura per fistulam sive calamum inspirata, et aqua (ob parum saponis admixtum) paulo tenaciore, miram et turritam bullarum structuram conficiunt. Res autem sic se habet; corpora ad tactum corporis amici sive similis se solvere et laxare; ad tactum autem corporis dissentientis se stringere et sustinere. Itaque appositionem corporis alieni esse consistentiæ causam. Sic videmus oleum aquæ admistum, ut fit in unguentis, liquiditatem, quæ et in aqua et in oleo antea vigebat, quadantenus exuere. Contra videmus, papyrum aqua madefactam se solvere, et consistentiam (quæ ob aërem antea in poris admistum valida erat) deponere; oleo vero madefactam, minus; quia oleum papyro minus consentiat. Idem quoque in saccharo videmus, et simi-

[1] M. Bouillet reads *procedere*, which is doubtless right.

libus, quæ ad aquam vel vinum intromittenda se laxant, neque solum cum liquores illis incumbunt, sed eosdem quoque sugunt et sursum trahunt.[1]

VII.

De consensu corporum, quæ sensu prædita sunt, et quæ sensu carent.

PASSIONES corporum, quæ sensu dotantur, et quæ sensu carent, magnum consensum habent; nisi quod in corpore sensibili accedat spiritus. Nam pupilla oculi speculo sive aquis æquiparatur; et simili natura imagines lucis et rerum visibilium excipit et reddit. Organum autem auditus obici intra locum cavernosum[2] conforme est, a quo vox et sonus optime resultat. Attractiones autem rerum inanimatarum, et rursus horrores sive fugæ (eas dico, quæ ex proprietate fiunt) in animalibus, olfactui atque odoribus gratis et odiosis conveniunt. Tactus autem ratio et gustus, omnem quæ in corporibus inanimatis accidere possit aut violentiam aut contra insinuationem almam et amicam, ac universas earundem passionum figuras, veluti vates aut interpres exprimit. Nam compressiones, extensiones, erosiones, separationes, et similia, in corporibus mortuis in processu latent, nec nisi post effectum manifestum percipiuntur. In animalibus autem cum sensu doloris secundum diversa genera aut characteres violentiæ peraguntur, permeante per omnia spiritu. Atque ab hoc principio deducitur cognitio, num forte alicui animantium adsit alius quispiam sensus, præter eos qui notantur; et quot et quales sensus in universo animantium genere esse possint. Ex passionibus enim materiæ rite distinctis sequetur numerus sensuum, si modo organa competant et accedat spiritus.

VIII.

De Motu Violento, quod sit fuga et discursatio partium rei propter pressuram, licet minime visibilis.

MOTUS violentus (quem vocant) per quem missilia, ut lapides, sagittæ, globi ferrei, et similia per aërem volant, fere omnium motuum est vulgatissimus. Atque in hujus tamen observatione

[1] The following sentence is added in the MS.: "Eadem est et spongiarum ratio. Quin et metalla dum per calorem liquefiant, majorem partium æqualitatem deposita naturali congelatione obtinent."—*J. S.*

[2] *loco cavernoso* in MS.

et inquisitione miram et supinam negligentiam hominum notare licet. Neque parvo detrimento in motus istius natura et potestate investiganda offenditur; cum ad infinita sit utilis, et tormentis, machinis, et universæ rei mechanicæ, sit instar animæ et vitæ. Plurimi autem se perfunctos inquisitione putant, si motum illum violentum esse pronuntient, et a naturali distinguant. Atque is sane est Aristotelis et scholæ ejus mos proprius et disciplina, curare ut habeant homines quod pronuntient, non quod sentiant; et docere quomodo aliquis affirmando aut negando se expedire, non cogitando se explicare et sibi satisfacere possit. Alii paulo attentius, arrepto illo posito duo corpora in uno loco esse non posse, restare aiunt ut quod fortius sit impellat, debilius cedat; eam cessionem sive fugam, si minor adhibeatur vis, non ultra durare quam prima impulsio continuetur; ut in protrusione; si autem major, etiam remoto corpore impellente ad tempus vigere, donec sensim remittatur; ut in jactu. Atque hi rursus, alio ejusdem scholæ more inveterato, primordia rei captant, de processu et exitu non solliciti; tanquam prima quæque cætera trahant; quo fit ut immatura quadam impatientia contemplationem abrumpant. Nam ad id quod corpora sub ipsum ictum cedant, aliquid afferunt; sed postquam corpus impellens jam remotum sit, adeo ut necessitas illa confusionis corporum jam plane cessaverit, cur postea motus continuetur, nihil dicunt, nec scipsi satis capiunt. Alii autem magis diligentes[1] et in inquisitione perseverantes, cum vim aëris in ventis et similibus quæ vel arbores et turres dejicere possit animadvertissent, opinati sunt eam vim quæ hujusmodi missilia post primam impulsionem deducat et comitetur aëri debere attribui, pone corpus quod movetur collecto et ingruenti; cujus impetu corpus tanquam navis in gurgite aquarum vehatur. Atque hi certe rem non deserunt, atque contemplationem ad exitum perducunt; sed tamen a veritate aberrant. Res autem vere in hunc modum se habet. Præcipuus motus partibus ipsius

[1] See Fracastorius, *De Sympath. et Antipath.* c. 4., to whom Bacon refers in the *Nov. Org.* [II. 36., Vol. I. p. 301.] That the medium through which a body is projected is the cause of its continuing to move after it has parted from that which projects it, had however been taught by Aristotle. See the *Physics*, viii. 10.; a passage which, though the theory of projectiles contained in it is altogether false, yet shows that Aristotle had formed a distinct though incomplete conception of the propagation of motion through any medium. Aristotle's view seems not to have been rightly understood by his commentators. See Brandis's *Scholia*, p. 451., at bottom; and compare Cardan, *De Subtil.* ii., and Vanini, *Dialogi*, xi.

corporis, quod volat, inesse videtur: qui, cum visu ob nimiam subtilitatem non percipiatur, homines non satis attendentes, sed levi observatione rem transmittentes, latet. Accuratius autem scrutanti manifeste constat, corpora quæ duriora sunt pressionis esse impatientissima, et ejusdem veluti sensum acutissimum habere; adeo ut quam minimum a naturali positione depulsa, magna pernicitate nitantur ut liberentur et in pristinum statum restituantur. Quod ut fiat, partes singulæ, facto principio a parte pulsata, se invicem non secus ac vis externa protrudunt ac urgent[1]; et fit continua et intensissima (licet minime visibilis) partium trepidatio et commotio. Atque hoc videmus fieri in exemplo vitri, sacchari, et hujusmodi rerum fragilium; quæ si mucrone aut ferro acuto secentur aut dividantur, protinus in aliis partibus, a tractu mucronis remotis, quasi in instanti disrumpuntur. Quod evidenter demonstrat communicationem motus pressuræ in partes succedentes. Qui motus cum per omnia moliatur et ubique tentet, ea parte confractionem inducit qua ex præcedente corporis dispositione minus fortis erat compactio. Neque tamen ipse motus, quando per omnia turbat et percurrit, sub aspectum venit, donec aperta fiat effractio sive continuitatis solutio. Rursus videmus, si forte filum ferreum, aut bacillum, aut durior pars calami (vel hujusmodi corpora, quæ flexibilia quidem sunt, non absque aliqua renitentia) inter pollicem et indicem per extrema sua curventur et stringantur, ea statim prosilire. Cujus motus causa manifeste deprehenditur non esse in extremis corporis partibus, quæ digitis stringuntur, sed in medio, quod vim patitur; ad cujus relevationem motus ille se expedit. In hoc autem exemplo plane liquet, causam illam motus quam adducunt de impulsione aëris excludi. Neque enim ulla fit percussio, quæ aërem immittat. Atque hoc etiam levi illo experimento evincitur, cum pruni nucleum recentem et lubricum premimus, digitosque paulatim adducimus, atque hac ratione emittimus. Nam et in hoc quoque exemplo compressio illa vice percussionis est. Evidentissimus autem hujusce motus effectus cernitur, in perpetuis conversionibus sive rotationibus corporum missilium dum volant. Siquidem ea procedunt utique, sed progressum suum faciunt in lineis spiralibus, hoc est procedendo et rotando. Atque certe is *motus spiralis*, cum tam sit rapidus, et nihilominus tam expeditus, et rebus quodammodo

[1] *vigent* in Gruter's edition.— *J. S.*

familiaris, nobis dubitationem movit, num forte ex altiore principio non penderet. Sed existimamus non aliam causam huic rei subesse, quam eandem quam nunc tractamus. Namque pressura corporis affatim motum in partibus sive minutiis ejus excitat, ut se quacunque via expediant et liberent. Itaque corpus non solum in linea recta agitur et provolat, sed undequaque experitur, atque ideo se rotat; utroque enim modo ad se laxandum nonnihil proficit. Atque in rebus solidis subtile quiddam et abditum; in mollibus evidens et quasi palpabile est. Nam ut cera vel plumbum, et hujusmodi mollia, malleo percussa cedunt, non tantum in directum, sed et in latera undequaque: eodem modo et corpora dura sive renitentia fugiunt et in recta linea et in circuitu. Cessio enim corporalis in mollibus, et localis in duris, ratione conveniunt; atque in corporis mollis efformatione, corporis duri passio, cum fugit et volat, optime conspicitur. Interim nemo existimet nos præter motum istum (qui caput rei est) non etiam aliquas partes aëri devehenti tribuere, qui motum principalem adjuvare, impedire, flectere, regere possit. Nam et ejus rei potestas est non parva. Atque hæc motus violenti sive mechanici (qui adhuc latuit) explicatio, veluti fons quidam practicæ est.

IX.

De causa motus in tormentis igneis, quod ex parte tantum, nec ea potiore, inquisita sit.

Tormentorum igneorum causa, et motus tam potentis et nobilis explicatio, manca est, et ex parte potiore deficit. Aiunt enim pulverem tormentarium, postquam in flammam conversus sit et extenuatus, se dilatare et majus spatium occupare: unde sequi,—ne duo corpora in uno loco sint, aut dimensionum penetratio fiat, aut forma elementi destruatur, aut situs partium præter naturam totius sit (hæc enim dicuntur),—corporis quod obstat expulsionem vel effractionem. Neque nihil est, quod dicunt. Nam et iste appetitus, et materiæ passio, et[1] hujusmodi motus pars aliqua. Sed nihilominus in hoc peccant, quod ad necessitatem istam corporis dilatandi rem præpropera cogitatione deducunt, neque quod natura prius est distincte considerant. Nam ut corpus pulveris, postquam in flammam mutatus est, majorem locum occupet, necessitatem sane habet; ut autem corpus pulveris inflammetur, idque tam rapide, id

[1] M. Boullet reads *est*.

simili necessitate non constringitur; sed ex præcedente motuum conflictu et comparatione pendet. Nam dubium non est, quin corpus illud solidum et grave, quod per hujusmodi motum extruditur vel removetur, antequam cedat, sedulo obnitatur; et si forte robustius sit, victoria potiatur; id est, ut non flamma globum expellat, sed globus flammam suffocet. Itaque si loco pulveris tormentarii, sulphurem vel caphuram vel similia accipias, quæ flammam et ipsa cito corripiunt, et (quia corporum compactio inflammationi impedimento est) ea in grana pulveris, admista cineris juniperi vel alicujus ligni maxime combustilis aliqua portione, efformes; tamen (si nitrum absit) motus iste rapidus et potens non sequitur: sed motus ad inflammationem a mole corporis renitentis impeditur et constringitur, nec se explicat aut ad effectum pertingit. Rei autem veritas sic se habet. Motum istum, de quo quæritur, geminatum et compositum reperias. Nam præter motum inflammationis, qui in sulphurea pulveris parte maxime viget, subest alius magis fortis et violentus. Is fit a spiritu crudo et aqueo, qui ex nitro maxime, et nonnihil a carbone salicis concipitur, qui et ipse expanditur certe (ut vapores subdito calore solent), sed una etiam (quod caput rei est) impetu rapidissimo a calore et inflammatione fugit et erumpit, atque per hoc etiam inflammationi vias relaxat et aperit. Hujusce motus rudimenta et in crepitationibus aridorum foliorum lauri vel hederæ cernimus, cum in ignem mittuntur; et magis etiam in sale, qui ad rei inquisitæ naturam propius accedit. Simile etiam quiddam et in sevo candelarum madido et in flatulentis ligni viridis flammis sæpe videmus. Maxime autem eminet iste motus in argento vivo, quod corpus maxime crudum, et instar aquæ mineralis est; cujus vires (si ab igne vexetur, et ab exitu prohibeatur) non multo pulveris tormentarii viribus inferiores sunt. Itaque hoc exemplo monendi homines sunt et rogandi, ne in causarum inquisitione unum aliquod arripiant, et facile pronuntient; sed circumspiciant, et contemplationes suas fortius et altius figant.

X.

De dissimilitudine cœlestium et sublunarium quoad æternitatem et mutabilitatem; quod non sit verificata.

Quod receptum est, universitatem naturæ veluti per globos recte dividi et distingui; ut alia sit ratio cœlestium, alia sub-

lunarium; id non absque causa introductum videtur, si in hac opinione modus adhibeatur. Dubium enim non est, quin regiones sub orbe lunari positæ et supra, una cum corporibus quæ sub eisdem spatiis continentur, multis et magnis rebus differant. Neque tamen hoc certius est quam illud, corporibus utriusque globi inesse communes inclinationes, passiones, et motus. Itaque unitatem naturæ sequi debemus, et ista distinguere potius quam discerpere, nec contemplationem frangere. Sed quod ulterius receptum est,—cœlestia mutationes non subire; sublunaria vero aut elementaria, quæ vocant, iisdem obnoxia esse; et materiam horum instar meretricis esse, novas formas perpetuo appetentem; illorum autem instar matronæ, stabili et intemerato connubio gaudentem;—popularis opinio videtur esse, et infirma, et ex apparentia et superstitione orta. Videtur autem nobis hæc sententia ex utraque parte labilis et sine fundamento. Nam neque cœlo ea competit æternitas quam fingunt, nec rursus terræ ea mutabilitas. Nam, quod ad cœlum attinet, non ea nitendum est ratione, mutationes ibidem non fieri, quia sub aspectum non veniunt. Aspectum enim frustrat et corporis subtilitas et loci distantia. Nam variæ inveniuntur aëris mutationes, ut in æstu, frigore, odoribus, sonis, manifestum est, quæ sub visum non cadunt. Neque rursus (credo), si oculus in circulo lunæ positus esset, a tanto intervallo quæ hic apud nos fiunt, et qui in superficie terræ obveniunt motus et mutationes machinarum, animalium, plantarum, et hujusmodi, (quæ pusillæ alicujus festucæ dimensionem, ob distantiam, non æquant,) cernere posset. In corporibus autem quæ tantæ molis et magnitudinis sunt, ut ob dimensionum suarum amplitudinem spatia distantiarum vincere atque ad aspectum pervenire possunt [1], mutationes in regionibus cœlestibus fieri, ex cometis quibusdam satis liquet; iis dico, qui [2] certam et constantem configurationem cum stellis fixis servarunt; qualis fuit illa, quæ [3] in Cassiopea nostra ætate apparuit.[4] Quod autem ad terram attinet; postquam ad interiora ejus, relicta ea quæ in

[1] M. Bouillet reads *possint*.

[2] *quæ* in MS.

[3] So in the original. It should apparently be *ille, qui*.—*J. S.*

[4] The star which appeared in Ophluchus in 1604 is generally mentioned by Galileo in conjunction with the one in Cassiopeia (which appeared in 1572), as evidence against the doctrine of the immutability of the heavens. It seems, therefore, that the *Cogitationes* were written before or not long after 1604, especially as in the *Descriptio Globi Intellectualis* the two stars are mentioned together. But a similar argument would show that they were written before or soon after 1600, as the new star in Cygnus is not mentioned. [On this last point see the preface p. 14.—*J. S.*]

superficie et partibus proximis invenitur incrustatione et mixtura, penetratum est, videtur et ibi quoque similis ei quæ in cœlo supponitur perpetuitas existere. Proculdubio enim est, si in profundo terra pateretur mutationes, consequentiam earum mutationum, etiam in nostra regione, quam calcamus, majores casus fuisse parituram quam fieri videmus. Sane terræ motus plerique, et eruptiones aquarum, vel eructationes ignium, non ex profundo admodum, sed prope, insurgunt; cum parvum aliquod spatium in superficie occupent. Quanto enim latiorem regionem et tractum hujusmodi accidentia in facie terræ occupant, tanto magis radices sive origines eorum ad viscera terræ penetrare putandum est. Itaque majores terræ motus (majores, inquam, ambitu, non violentia) qui rarius eveniunt, recte cometis ejus generis de quo diximus æquiparari possunt; qui et ipsi infrequentes sunt; ut illud maneat quod initio diximus, inter cœlum et terram, quatenus ad constantiam et mutationem, non multum interesse. Si quem autem æquabilitas et certitudo motus in corporibus cœlestibus apparens movet, veluti æternitatis comes individuus; præsto est oceanus, qui in æstu suo haud multo minorem constantiam ostendat.[1] Postremo, si quis adhuc instet, negari tamen non posse quin in ipsa superficie orbis terrarum et partibus proximis infinitæ fiant mutationes, in cœlo non item; huic ita responsum volumus: nec nos hæc per omnia æquare; et tamen si regiones (quas vocant) *superiorem* et *mediam* aëris pro superficie aut interiore tunica cœli accipiamus, quemadmodum spatium istud apud nos, quo animalia, plantæ, et mineralia continentur, pro superficie vel exteriore tunica terræ accipimus, et ibi quoque varias et multiformes generationes et mutationes inveniri.[2] Itaque tumultus fere omnis, et conflictus, et perturbatio, in confiniis tantum cœli et terræ locum habere videtur. Ut in rebus civilibus fit; in quibus illud frequenter usu venit, ut duorum regnorum fines continuis incursionibus et violentiis infestentur, dum interiores utriusque regni provinciæ secura pace atque alta quiete fruuntur. Nemo autem, si recte attenderit, religionem hic opponat. Nam ethnica jactantia solummodo prærogativa ista cœlum materiatum donavit, ut sit incorruptibile. Scripturæ autem Sacræ æternitatem et corruptionem cœlo et terræ ex æquo, licet gloriam et venerationem disparem, attribuunt. Nam si legatur, *solem et lunam*

[1] *ostentat* in MS. [2] *invenire* in MS.

fideles et æternos in cœlo testes esse ; legitur etiam, *generationes migrare, terram autem in æternum manere.* Quod autem utrumque transitorium sit, uno oraculo continetur, nempe *cœlum et terram pertransire, verbum autem Domini non pertransire.* Neque hæc nos novi placiti studio diximus, sed quod ista rerum et regionum conficta divortia et discrimina, ultra quam veritas patitur, magno impedimento ad veram philosophiam et naturæ contemplationem fore, haud ignari sed exemplo edocti, providemus.

DE

FLUXU ET REFLUXU MARIS.

PREFACE

TO THE

DE FLUXU ET REFLUXU MARIS.

BY ROBERT LESLIE ELLIS.

It was a natural result of the progress of maritime discovery in the sixteenth century, that much was thought and written on the subject of the tides. The reports continually brought home touching the ebb and flow of the sea on far distant shores, not only excited curiosity, but also showed how little the philosophers of antiquity had known of the phenomena which they attempted to explain. Men who dwelt on the shores of an inland sea, and whose range of observation scarcely extended beyond the Pillars of Hercules, were in truth not likely to recognise any of the general laws by which these phenomena are governed. Their authority accordingly in this matter was of necessity set aside; and a number of hypotheses were proposed in order to explain the newly discovered facts. Of these speculations an interesting account is given in the twenty-eighth book of the *Pancosmia* of Patricius. It is not, however, complete; no mention being made of the hypothesis of Cæsalpinus, which is in itself a curious one, and which clearly suggested to Galileo his own explanation of the cause of the tides. Otto Casmann, the preface to whose *Problemata Marina* is dated in 1596, gives a good deal of information on the same subject, some of which however seems to be simply copied from Patricius; but he mentions Cæsalpinus, whom, as I have said, Patricius omits. Patricius, it may be remarked, is a scrupulously orthodox philosopher, and dedicates his work to Gregory XIV. with many expressions of reverence and submission.

It is perhaps on this account that he has said nothing of Cæsalpinus, whose works were "improbatæ lectionis" and who seeks to explain the tides, and also certain astronomical phenomena, by denying the orthodox doctrine of the earth's immobility.

The earliest modern writer whom Patricius mentions is Frederick Chrysogonus, whose work on the tides must have been published in 1527. To his account of the phenomena little, according to Patricius, was added by subsequent writers; nor are his statements contradicted by the reports of seafaring men, who however mention certain matters of detail which he had omitted. Of seamen Patricius particularly mentions Peter of Medina and Nicolaus Sagrus, the latter with especial commendation. From Sagrus (but probably through Patricius) Bacon derived some of the statements of the following tract; those, namely, which relate to the progress of the tide-wave from the Straits of Gibraltar to Gravelines. On the day of new moon, according to Sagrus, there is high water along the coast from Tarifa to Rota at an hour and a half after midnight. After mentioning several intermediate places, he says that along the coast of Normandy as far as Calais and Nieuport there is high water at nine, and after a not very distinct statement as to the time of high water in the middle of the channel, goes on to state that from Calais to Gravelines the water is high off shore (in derotâ) at an hour and a half after midnight, that is at the same time as at Rota, and at Zealand at the same time as on the coast of Portugal. These statements are scarcely sufficiently accurate to make it worth while to compare them with modern observations; but it is necessary to remark that Sagrus, though he mentions it as a remarkable circumstance that the time of high water should be the same at Gravelines and at Rota, does not mean to assert that there is any discontinuity in the progress of the tide along the shores of France and the Netherlands. The tide gets progressively later and later until we come to a place where there is high water about one in the afternoon, and therefore also high water about half-past one after the succeeding midnight. In order to compare Gravelines and Rota, he takes (but without mentioning that he does so) two different tide-waves, —the statement with reference to Gravelines appearing to relate to a later wave than the other. Bacon however does

not appear to have understood this; and consequently, after saying that the hour of high water becomes later and later from the Straits of Gibraltar to the coast of Normandy, proceeds thus:—"Hucusque ordinatim; ad Gravelingam vero, verso prorsus ordine, idque magno saltu, quasi ad eandem horam cum ostio freti Herculei." This notion of a reversal of the order of the tides as we proceed along the French and Dutch coast is not justified either by Sagrus's statements or by the phenomena to which they relate.[1]

Sagrus is probably the first writer who remarks that the time of high water is not always the same as that of slack water. "Et illud adnotat Sagrus," says Patricius, "non minus mirum" (he has been speaking of the coincidence as to the time of high water between the Dutch and Portuguese coasts) "si a Selandiâ quis ad caput Angliæ Dobla [Dover?] naviget, mare plenum erit a medinoctio tertiâ quidem horâ, sed eodem itinere, fluxus aquæ obvius fiet per horas duas cum dimidiâ donec flaccescat, quod nautæ dicunt aquam fieri stancam." Patricius rightly compares this with the phenomenon observed at Venice, namely that when the water has already sunk half a foot at the entrance of the harbour it is still rising in the harbour itself.

With respect to theories of the cause of the tides, it may be observed that a connexion of some kind or other between the tides and the moon has at all times been popularly recognised. But the conception which was formed as to the nature of this connexion long continued vague and indefinite; and in Bacon's time those who speculated on the subject were disposed to reject it altogether. One theory, that of Telesius and Patricius, compares the sea to the water in a caldron; that is to say it rises and tends to boil over when its natural heat is called forth under the influence of the sun, moon, and stars, and then after a while subsides. But why should this alternate rise and fall have a definite period of six hours? Patricius calmly answers, "nimirum quia omnis motus fit in tempore," and that there is no better reason for asking the question than for asking why certain other motions have periods of seven or fourteen days, of six months or twelve.

Another theory, which was propounded by Sfondratus, in a

[1] I have given Sagrus's statements *in extenso* in a note on the passage in the text. He seems to have forgotten that Nieuport is farther from Calais than Gravelines.

tract published in 1590, and entitled *Causa Æstûs Maris*, explains the reciprocating motion of ebb and flow [as owing] to the effect produced by the continent of America. The water under the influence of the sun moves in accordance with the motion of the heavens from east to west. But it is reflected and made to regurgitate eastward by impinging on the coast of America, which was supposed to extend indefinitely southward (Cape Horn was not discovered until [1615]) and which permits only a portion of it to pass through the Straits of Magellan. Between this theory, of which Patricius speaks contemptuously and without mentioning the name of its author, and that which J. C. Scaliger had put forth in the *Exercitationes adversum Cardanum*, 52., there is no essential difference, though Scaliger ascribes the general westward motion of the ocean to its sympathy with the moon. But in both theories the change of direction of the motion is ascribed to the action of the coast of America; and both were doubtless suggested by the current which flows from east to west through the Straits of Magellan.

Bacon himself, as we perceive from the following tract, was inclined to adopt the same view. He compares the Straits of Dover with those of Magellan, and conceives that the German Ocean exhibits on a small scale the same phenomena of a stream tending in one direction, and compelled to regurgitate in the opposite one by the obstacles which it meets with, as the great Atlantic. This at least appears to be the import of the expressions of which he makes use. That the period of the revolution of the waters round the earth is greater than twenty-four hours, appeared to Bacon to be in entire accordance with the retardation of the diurnal motion of the planets. All the inferior orbs lag behind the starry heaven, and that of the moon most of all; wherefore the moon's diurnal period is more nearly the same as that of the waters than any other.

In these views there is an absolute confusion between the bodily motion of water as in a current, and the propagation of an undulation; a confusion not unnatural, seeing that to conceive the motion of an undulation apart from that of the matter of which it is composed is by no means easy. Scaliger however might have learned from Cardan, notwithstanding the arrogance with which he treats him, to distinguish between them. For Cardan, after saying that high water follows the

moon, inquires why the motion of the flood current is so much slower than the moon's. He answers: "Causa est, quod non tota aqua, nec una pars lunam sequitur, sed proximæ in proximas transferuntur, velut si quis carnem comprimens tumorem elevet, caro quidem parum loco movebitur, celerrimè tamen tumor per totum crus transferetur."[1]

It became necessary, when the flood current was confounded with the motion of the tide wave, to assign a cause for the reciprocating motion of ebb and flow; and this cause was sought for in the configuration of land and sea.

It seems as if Aristotle, if he had developed any theory of the tides, would have had recourse to some similar explanation. Thus Strabo says, (I quote from Xylander's translation,) "Jam Aristotelem Posidonius ait æstuum marinorum qui fiunt in Hispaniâ causas non recte ascribere litori et Mauritaniæ" (by litori is probably meant the coast of Spain itself), "dicentem mare ideo reciprocare, quia extrema terrarum sublimia sint et aspera, quæ et fluctum duriter excipiant et in Hispaniam repercutiant, cum pleraque litora sint humilia et arenæ tumulis constent."[2] With this passage is to be compared what Aristotle says in the commencement of the second book of the *Meteorologics*, from which it appears to have been his opinion that the seas within the Pillars of Hercules flow continually outwards in consequence of differences of level, and that where the sea is girt in by straits its motion becomes visible in the form of a reciprocating libration: *διὰ τὸ ταλαντεύεσθαι δεῦρο κἀκεῖσε.* This obscure expression is taken to relate to the tides, and probably does so. It suggested to Cæsalpinus his theory of their cause. At least he quotes it, and dilates on its meaning; and when the ebb and flow of the sea is conceived of as a libration, it is easily inferred that this libration ought to be ascribed not directly to the fluid itself but to that on which it rests. And this notion of the libration of the earth connected itself with his views of astronomy. For in order to get rid of the necessity of supposing the existence of a ninth and tenth heaven,—the former to explain the precession of the equinoxes, and the latter the imaginary phenomenon of

[1] De Subtilit. ii. p. 408.

[2] Strabo, iii. p. 153. It is worth remarking that this passage is quoted by Ideler in his edition of the *Meteorologics*, i. p. 501., in a way which makes it quite unintelligible, some words having been accidentally omitted.

their trepidation,—he ascribed the motion by which these phenomena are produced to the earth itself. The cause of this motion he sought in the action of the ambient air on the earth's surface. To explain trepidation, the earth's motion was supposed to be in some measure libratory and irregular; and by being so it produced the tides.[1]

From the theory of Cæsalpinus we pass naturally to that of Galileo, seeing that in both the tides are explained by the unequal motion of the earth. Galileo's theory was first propounded in a letter to Cardinal Orsino, dated 1616. He remarks that the libratory motion "che alcuno ha attribuito alla Terra," (alluding of course to Cæsalpinus,) is in several respects not such as to save the phenomena, and maintains that the true cause is to be sought in the combination of the earth's motion in its orbit with its rotation on its own axis. In consequence of this combination, the velocity of any point of the earth's surface varies, going through its different values in the space of twenty-four hours. The waters of the sea, not accommodating themselves to this varying velocity, ebb and flow at any place as their velocity is less or greater than that of their bed. The boldness of the assertions by which Galileo supports this theory is remarkable: thus he affirms that the ebb and flow is always from west to east, and vice versâ; and that the notion that, speaking generally, the interval between high water and low is six hours "è stata un' ingannevole opinione la quale ha poi fatto favoleggiare gli scrittori con molte vane fantasie." No refutation of a theory which altogether misrepresents the facts which it proposes to explain could ever have been needed; but the advance of mechanical science has long since made it easy to show that no reciprocating motion of the waters of the sea could be produced in the manner described by Galileo.

Bacon does not mention Galileo's theory in the present tract, which was therefore probably written before or not long after 1616. But in the *Novum Organum* [II. 46.] it is mentioned and condemned; one ground of censure being that it proceeds on the untenable hypothesis of the earth's motion, and the other that the phenomena are misrepresented.

Bacon, both in this tract and in the *Novum Organum*,

[1] Quæstiones Peripat. iii. 4. and 5.

ascribes the tides in the Atlantic to a derivative motion of the waters, caused by the obstacles which the form of the continents of the old and new worlds oppose to its general westerly movement. It is thus that he meets the objection which would arise from the circumstance that there is high water at the same time on corresponding points of the shores of Europe and America. This notion of a derivative tide is absolutely necessary in the detailed explanation of the phenomena, and I am not aware that any one had previously suggested it, at least in the distinct form in which Bacon puts it. He admits that, if the tides of the Pacific synchronise with those of the Atlantic, his theory that the tides depend on a progressive motion of the ocean must be given [up]. If it be high water on the shores of Peru and China at the same hours as on those of Florida and Europe, there are no shores left on which there can then be low water. For the important observation that the hours of high water correspond, speaking roughly, on the European and American coasts, Bacon quotes in the *De Fluxu et Refluxu Maris* no authority; but in the *Novum Organum* he ascribes it to Acosta and others. But it is very remarkable that Acosta does not say what Bacon makes him say, namely that the times of high water are the same on the coast of Florida and that of Europe, and that he does say what Bacon admits would be fatal to his theory, namely that there is high water at the same time in the Atlantic and Pacific oceans. In his *Natural History of the Indies*, iii. 14., he speaks of the tides, and of the two theories by which they had been explained. There are some, he says, who affirm that the ebb and flow of the sea resembles a caldron of water moved to and fro, the water rising on one side when it falls on the other, and reciprocally; while others liken it to the boiling over of a pot, which rises and falls on all sides at once. The second view is in his judgment the true one. He says that he had inquired from a certain pilot, Hernandez Lamero [1], who had sailed through the Straits of Magellan about the year 1579, how he had found the tides there, and particularly if the tide of the South Sea or Pacific flowed when that of the North Sea or Atlantic ebbed, and vice versâ. Lamero made answer that it was not so, that both tides ebb

[1] See Acosta, iii. 11.

and flow together, and that they meet about seventy leagues from the Atlantic and thirty from the South Sea. With this statement Acosta is altogether satisfied; and so far from trying to compare the time of high water on the opposite shores of the Atlantic, he remarks that but for the Straits of Magellan it would be impossible to determine experimentally which of the two theories he has mentioned is the true one; as only angels could make observations on both sides of the ocean at once, the eyes of men not reaching far enough to do so, and the distance being too great to be crossed by man in the time of a single tide.

DE FLUXU ET REFLUXU MARIS.

CONTEMPLATIO de causis fluxus et refluxus maris, ab antiquis tentata et deinde omissa, junioribus repetita, et tamen varietate opinionum magis labefactata quam discussa, vulgo levi conjectura refertur ad lunam, ob consensum nonnullum motus ejusdem cum motu lunæ. Attamen diligentius perscrutanti vestigia quædam veritatis se ostendunt, quæ ad certiora deducere possint. Itaque ne confusius agatur, primo distinguendi sunt motus maris, qui licet satis inconsiderate multiplicentur a nonnullis, inveniuntur revera tantum quinque; quorum unus tanquam anomalus est, reliqui constantes. Primus ponatur motus ille vagus et varius (quos appellant) *currentium*. Secundus motus magnus oceani sexhorarius, per quem aquæ ad littora accedunt et recedunt alternatim bis in die, non exacte, sed cum differentia tali quæ periodum constituat menstruam. Tertius motus ipse menstruus, qui nil aliud est quam restitutio motus (ejus quem diximus) diurni ad eadem tempora. Quartus motus semimenstruus, per quem fluxus habent incrementa in noviluniis et pleniluniis, magis quam in dimidiis. Quintus motus semestris, per quem fluxus habent incrementa auctiora et insignia in æquinoctiis. Atque de secundo illo motu magno oceani sexhorario sive diurno, nobis in præsentia sermo est præcipue et ex intentione; de reliquis solummodo in transitu, et quatenus faciant ad hujusce motus explicationem. Primo igitur, quod ad motum currentium attinet, dubium non est quin pro eo ac aquæ vel ab angustiis premuntur, vel a liberis spatiis laxantur, vel in magis declivia festinant ac veluti effunduntur, vel in eminentiora incurrunt ac inscendunt, vel fundo labuntur æquabili, vel fundi sulcis et inæqualitatibus perturbantur, vel in alios currentes incidunt atque cum illis se miscent et compatiuntur, vel etiam a ventis agitantur, præsertim anniversariis sive statariis, qui sub anni certas tempestates redeunt, aquas ex his et simili-

bus causis impetus et gurgites suos variare, tam consecutione ipsius motus atque latione quam velocitate sive mensura motus, atque inde constituere eos quos vocant *currentes*. Itaque in maribus, tum profunditas fossæ sive canalis atque interpositæ voragines et rupes submarinæ, tum curvitates littorum, et terrarum prominentiæ, sinus, fauces, insulæ multis modis locatæ, et similia, plurima possunt, atque agunt prorsus aquas earumque meatus et gurgites in omnes partes, et versus orientem et versus occidentem, austrum versus similiter et septentriones, atque quaquaversum, prout obices illi aut spatia libera et declivia sita sint et invicem configurentur. Segregetur igitur motus iste aquarum particularis et quasi fortuitus, ne forte ille in inquisitione quam prosequimur obturbet. Neminem enim par est constituere et fundare abnegationem eorum quæ mox dicentur de motibus oceani naturalibus et catholicis, opponendo motum istum currentium, veluti cum thesibus illis minime convenientem. Sunt enim currentes meræ compressiones aquarum, aut liberationes a compressione: suntque, ut diximus, particulares et respectivi, prout locantur aquæ et terræ, aut etiam incumbunt venti. Atque hoc quod diximus eo magis memoria tenendum est atque diligenter advertendum, quia motus ille universalis oceani, de quo nunc agitur, adeo mitis est et mollis, ut a compulsionibus currentium omnino dometur et in ordinem redigatur, cedatque, et ad eorum violentiam agatur et regatur. Id autem ita se habere ex eo perspicuum est vel maxime, quod motus simplex fluxus et refluxus maris in pelagi medio, præsertim per maria lata et exporrecta, non sentiatur, sed ad littora tantum. Itaque nihil mirum si sub currentibus (utpote viribus inferior) lateat et quasi destruatur, nisi quod ille ipse motus, ubi currentes secundi fuerint, eorum impetum nonnihil juvet atque incitet; contra ubi adversi, modicum frenet. Misso igitur motu currentium, pergendum est ad motus illos quatuor constantes, *sexhorarium, menstruum, semimenstruum*, et *semestrem;* quorum solus sexhorarius videtur fluxus maris agere et ciere, menstruus vero videtur tantummodo motum illum determinare et restituere, semimenstruus autem et semestris eundem augere et intendere. Etenim fluxus et refluxus aquarum qui littora maris ad certa spatia inundat et destituit, et horis variis variat et vi ac copia aquarum, unde reliqui illi tres motus se dant conspiciendos. Itaque de illo ipso motu fluxus et refluxus sigillatim ac proprie (ut instituimus) videndum. Atque primo

illud dari prorsus necesse est: motum hunc de quo inquirimus unum ex duobus istis esse, vel motum sublationis et demissionis aquarum, vel motum progressus. Motum autem sublationis et demissionis talem esse intelligimus, qualis invenitur in aqua bullienti, quæ in caldario attollitur et rursum residet. At motum progressus talem, qualis invenitur in aqua vecta in pelvi, quæ unum latus deserit, cum ad latus oppositum advolvitur. Quod vero motus iste neutiquam sit primi generis, occurrit illud inprimis, quod in diversis mundi partibus variant æstus secundum tempora; ut fiant in aliquibus locis fluxus et augmenta aquarum, cum alibi sint ad eas horas refluxus et decrementa. Debuerant autem aquæ, si illæ non progrederentur de loco in locum sed ex profundo ebullirent, ubique[1] simul se attollere, atque rursu simul se recipere. Videmus enim duos illos alios motus, semestrem et semimenstruum, per universum orbem terrarum simul perfungi atque operari. Fluxus enim sub æquinoctiis ubique augentur; non in aliis partibus sub æquinoctiis, in aliis sub tropicis; atque similis est ratio motus semimenstrui. Ubique enim terrarum invalescunt aquæ in noviluniis, nullibi in dimidiis. Itaque videntur revera aquæ in duobus illis motibus plane attolli et demitti, et veluti pati apogæum et perigæum, quemadmodum cœlestia. Atque in fluxu et refluxu maris, de quo sermo est, contra fit: quod motus in progressu certissimum signum est. Præterea si fluxus aquarum ponatur esse sublatio, attendendum paulo diligentius quomodo ista sublatio fieri possit. Aut enim fiet tumor ab aucto quanto aquarum, aut ab extensione sive rarefactione aquarum in eodem quanto, aut per sublationem simplicem in eodem quanto atque eodem corpore. Atque tertium illud prorsus abjiciendum. Si enim aqua, qualis est, attollatur, ex hoc relinquatur necessario inane inter terram atque ima aquæ, cum non sit corpus quod succedat. Quod si sit nova moles aquæ, necesse est eam emanare atque scaturire e terra. Sin vero sit extensio tantum, id fiet vel per solutionem in magis rarum, vel appetitum appropinquandi ad aliud corpus quod aquas veluti evocet et attrahat et in sublimius tollat. Atque certe ista aquarum sive ebullitio, sive rarefactio, sive conspiratio cum alio quopiam corpore ex superioribus, non incredibilis videri possit in mediocri quantitate, atque adhibito etiam bono temporis spatio, in quo hujusmodi tumores sive augmenta se colligere et cumulare possint.

[1] *ibique* in the original. — *J. S.*

Itaque excessus ille aquarum qui inter æstum ordinarium atque æstum illum largiorem semimenstruum aut etiam illum alterum profusissimum semestrem notari possit, cum nec mole excessus inter fluxum et refluxum æquiparetur atque habeat etiam bene magnum intervallum temporis ad incrementa illa sensim facienda, nihil habeat alienum a ratione. Ut vero tanta erumpat moles aquarum, quæ excessum illum qui invenitur inter ipsum fluxum et refluxum salvet; atque hoc fiat tanta celeritate, videlicet bis in die, ac si terra, secundum vanitatem illam Apollonii [1], respiraret, atque aquas per singulas sex horas efflaret, ac deinde absorberet; incommodum maximum. Neque moveatur quispiam levi experimento, quod putei nonnulli in aliquibus locis memorentur consensum habere cum fluxu et refluxu maris; unde suspicari quis possit, aquas in cavis terræ conclusas similiter ebullire; in quo casu tumor ille ad motum progressivum aquarum referri commode non possit. Facilis enim est responsio, posse fluxum maris accessione sua multa loca cava ac laxa terræ obturare atque opplere, atque aquas subterraneas vertere, etiam aërem conclusum reverberare, qui serie continuata hujusmodi puteorum aquas trudendo attollere possit. Itaque hoc in omnibus puteis minime fit, nec in multis adeo; quod fieri debuit, si universa massa aquarum naturam haberet ebullientem per vices, et cum æstu maris consensionem. Sed contra raro admodum fit, ut instar miraculi fere habeatur; quia scilicet hujusmodi laxamenta et spiracula quæ a puteis ad mare pertingunt absque obturatione aut impedimento raro admodum inveniantur. Neque abs re est memorare quod referunt nonnulli, in fodinis profundis, non procul a mari sitis, aërem incrassari et suffocationem minari ad tempora fluxus maris; ex quo manifestum videri possit non aquas ebullire (nullæ cum cernuntur), sed aërem retroverti. At certe aliud urget experimentum non contemnendum, sed magni ponderis, cui responsio omnino debetur; hoc est, quod diligenter observatum sit, idque non fortuito notatum sed de industria inquisitum atque repertum, aquas ad littora adversa Europæ et Floridæ iisdem horis ab utroque littore refluere, neque deserere littus Europæ cum advolvantur ad littora Floridæ, more aquæ (ut supra diximus) agitatæ in pelvi, sed plane simul ad utrumque littus attolli et demitti.[2] Verum hujus objectionis solutio

[1] Philos. Vit. Apoll. Tyan. [See *Sylva Sylvarum*, Vol. II. p. 640.—*J.S.*]

[2] See the note on *Nov. Org.* II. 36., where Acosta's name is mentioned in connexion with this statement. [See also the preface; supra p. 45.]

perspicue apparebit in iis quæ mox dicentur de cursu et progressu oceani. Summa autem rei talis est, quod aquæ a mari Indico profectæ, et ab objectu terrarum veteris et novi orbis impeditæ, truduntur per mare Atlanticum ab Austro in Boream; ut non mirum sit eas ad utrumque littus simul ex æquo appellere, ut aquæ solent quæ contruduntur a mari in ostia et canales fluminum, in quibus evidentissimum est motum maris esse progressivum quatenus ad flumina, et tamen littora adversa simul inundare. Verum id pro more nostro ingenue fatemur, idque homines attendere et meminisse volumus: si per experientiam inveniatur fluxus maris iisdem temporibus ad littora Peruviæ atque Chinæ affluere quibus fluunt ad littora præfata Europæ et Floridæ, opinionem hanc nostram, quod fluxus et refluxus maris sit motus progressivus, abjudicandam esse. Si enim per littora adversa tam maris Australis quam maris Atlantici fiat fluxus ad eadem tempora, non relinquuntur in universo alia littora per quæ refluxus ad eadem illa tempora satisfaciat. Verum de hoc judicio faciendo per experientiam (cui causam submisimus) loquimur tanquam securi. Existimamus enim plane, si summa hujus rei per universum terrarum orbem nobis cognita foret, satis æquis conditionibus istud fœdus transigi, nempe ut ad horam aliquam certam fiat refluxus in aliquibus partibus orbis, quantum fiat fluxus in aliis. Quamobrem ex iis quæ diximus, statuatur tandem motus iste fluxus et refluxus esse progressivus.

Sequitur jam inquisitio *ex qua causa, et per quem consensum rerum, oriatur atque exhibeatur iste motus fluxus et refluxus.* Omnes enim majores motus (si sunt iidem regulares et constantes) solitarii aut (ut astronomorum vocabulo utamur) ferini [1] non sunt, sed habent in rerum natura cum quibus consentiant. Itaque motus illi, tam semimenstruus incrementi quam menstruus restitutionis, convenire videntur cum motu lunæ. Semimenstruus vero ille sive æquinoctialis cum motu solis. Etiam sublationes et demissiones aquarum cum apogæis et perigæis cœlestium. Neque tamen continuo sequetur (idque homines advertere volumus), quæ periodis et curriculo temporis aut etiam modo lationis conveniunt, ea natura esse subordinata, atque alterum alteri pro causa esse. Nam non eo usque progredimur, ut affirmemus motus lunæ aut solis pro causis poni

[1] See Vol. I. p. 269. note 3. — *J. S.*

motuum inferiorum qui ad illos sunt analogi, aut solem et lunam (ut vulgo loquuntur) dominium habere super illos motus maris, (licet hujusmodi cogitationes facile mentibus hominum illabantur ob venerationem cœlestium); sed et in illo ipso motu semimenstruo (si recte advertatur) mirum et novum prorsus fuerit obsequii genus, ut æstus sub noviluniis et pleniluniis eadem patiantur, cum luna patiatur contraria; et multa alia adduci possint quæ hujusmodi dominationum phantasias destruant, et eo potius rem deducant, ut ex materiæ passionibus catholicis et primis rerum coagmentationibus consensus illi oriantur, non quasi alterum ab altero regatur, sed quod utrumque ab iisdem originibus et concausis emanet. Veruntamen (utcunque) manet illud quod diximus, naturam consensu gaudere, nec fere aliquid monodicum[1] aut solitarium admittere. Itaque videndum de motu fluxus et refluxus maris sexhorario, cum quibus aliis motibus ille convenire aut consentire reperiatur. Atque inquirendum primo de luna, quomodo iste motus cum luna rationes aut naturam misceat. Id vero fieri omnino non videmus, præterquam in restitutione menstrua: nullo modo enim congruit curriculum sexhorarium (id quod nunc inquiritur) cum curriculo menstruo; neque rursus fluxus maris passiones lunæ quascumque sequi deprehenduntur. Sive enim luna sit aucta lumine sive diminuta, sive illa sit sub terra sive super terram, sive illa elevetur super horizontem altius aut depressius, sive illa ponatur in meridiano aut alibi, in nulla prorsus harum consentiunt fluxus atque refluxus.

Itaque, missa luna, de aliis consensibus inquiramus. Atque ex omnibus motibus cœlestibus constat, motum diurnum maxime curtum esse, et minimo temporis intervallo (spatio videlicet viginti quatuor horarum) confici. Itaque consentaneum est, motum istum de quo inquirimus (qui adhuc tribus partibus diurno brevior est) proxime ad eum motum referri qui est ex cœlestibus brevissimus; sed hoc rem minus premit. Illud vero longe magis nos movet, quod ita sit iste motus dispertitus ut ad diurni motus rationes respondeat; ut licet motus aquarum sit motu diurno quasi innumeris partibus tardior, tamen sit commensurabilis. Etenim spatium sexhorarium est diurni motus quadrans, quod spatium (ut diximus) in motu isto maris invenitur cum ea differentia quæ coincidat in mensuram

[1] *monadicum.* See Vol. I. p. 165. note 3. — *J.S.*

motus lunæ. Itaque hoc nobis penitus insedit ac fere instar oraculi est, motum istum ex eodem genere esse cum motu diurno. Hoc igitur usi fundamento pergemus inquirere reliqua; atque rem omnem triplici inquisitione absolvi posse statuimus. Quarum prima est, an motus ille diurnus terminis cœli contineatur, aut delabatur et se insinuet ad inferiora? Secunda est, an maria regulariter ferantur ab oriente in occidentem, quemadmodum et cœlum? Tertia, unde et quomodo fiat reciprocatio illa sexhoraria æstuum, quæ incidit in quadrantem motus diurni, cum differentia incidente in rationes motus lunæ? Itaque quod ad primam inquisitionem attinet, arbitramur motum rotationis sive conversionis ab oriente in occidentem esse motum non proprie cœlestem, sed plane cosmicum, atque motum in fluoribus magnis primarium, qui usque a summo cœlo ad imas aquas inveniatur, inclinatione eadem, incitatione autem (id est, velocitate et tarditate) longe diversa; ita tamen ut ordine minime perturbato minuatur celeritate quo propius corpora accedunt ad globum terræ. Videtur autem primo probabile argumentum sumi posse, quod motus iste non terminetur cum cœlo, quia per tantam cœli profunditatem, quanta interjicitur inter cœlum stellatum et lunam (quod spatium multo amplius est quam a luna ad terram), valeat atque vigeat iste motus, cum debitis decrementis suis; ut verisimile non sit naturam istiusmodi consensum, per tanta spatia continuatum et gradatim se remittentem, subito deponere. Quod autem res ita se habeat in cœlestibus, evincitur ex duobus, quæ aliter sequentur, incommodis. Cum enim manifestum sit ad sensum planetas diurnum motum peragere, nisi ponatur motus iste tanquam naturalis ac proprius in planetis omnibus, confugiendum necessario est vel ad raptum primi mobilis, quod naturæ prorsus adversatur, aut ad rotationem terræ, quod etiam satis licenter excogitatum est, quoad rationes physicas. Itaque in cœlo ita se res habet. Postquam autem a cœlo discessum est, cernitur porro iste motus evidentissime in cometis humilioribus, qui, cum inferiores orbe lunæ sint, tamen ab oriente in occidentem evidenter rotant. Licet enim habeant motus suos solitarios et irregulares, tamen in illis ipsis conficiendis interim communicant[1] cum motu ætheris et ad eandem conversionem feruntur; tropicis vero non con-

[1] [*communicandis* in the original.] M. Bouillet's reading is *communicant*, which is doubtless right.

tinentur fere, nec habent regulares spiras, sed excurrunt quandoque versus polos, sed nihilominus in consecutione ab oriente in occidentem rotant. Atque hujusmodi motus iste licet magna acceperit decrementa (cum quo propius descendatur versus terram, eo et minoribus circulis conversio fiat, et nihilominus tardius), validus tamen utique manet, ut magna spatia brevi tempore vincere queat. Circumvolvuntur enim hujusmodi cometæ circa universum ambitum et terræ et aëris inferioris spatio viginti quatuor horarum, cum horæ unius aut alterius excessu. At postquam ad eas regiones descensu continuato perventum sit, in quas terra agit non solum communicatione naturæ et virtutis suæ (quæ motum circularem reprimit et sedat), sed etiam immissione materiali particularum substantiæ suæ per vapores et halitus crassos, iste motus immensum hebescit, et fere corruit, sed non propterea prorsus exinanitur aut cessat, sed manet languidus et tanquam latens. Etenim jam in confesso esse cœpit, navigantibus intra tropicos, ubi libero æquore motus aëris percipitur optime, et aër ipse (veluti et cœlum) majoribus circulis idcoque velocius rotat, spirare auram perpetuam et jugem ab oriente in occidentem; adeo ut qui Zephyro uti volunt, eum extra tropicos sæpius quærant et procurent.[1] Itaque non extinguitur iste motus etiam in aëre infimo, sed piger jam devenit et obscurus, ut extra tropicos vix sentiatur. Et tamen etiam extra tropicos in nostra Europa in mari, cœlo sereno et tranquillo, observatur aura quædam solisequa, quæ ex eodem genere est; etiam suspicari licet, quod hic in Europa experimur, ubi flatus Euri acris est et desiccans, cum contra Zephyri sit genialis[2] et humectans, non solum ex hoc pendere, quod ille a continente, iste ab oceano apud nos spiret; sed etiam ex eo, quod Euri flatus, cum sit in eadem consequentia cum motu aëris proprio, eum motum incitet et irritet, ac propterea aërem dissipet et rarefaciat: Zephyri vero flatus, qui in contraria consequentia sit cum motu aëris, aërem in se vertat, et propterea inspisset. Neque illud contemnendum, quod vulgari observatione recipitur, nubes quæ feruntur in sublimi plerumque movere ab oriente in occidentem, cum venti circa terram ad eadem tempora flant in contrarium. Quod si hoc non semper faciunt, id in causa esse, quod sint quandoque venti contrarii, alii in alto, alii in imo; illi autem in alto spirantes

[1] See Acosta, Hist. des Indes, iii. 4.

[2] [*generalis* in original.] This is obviously an error, the true reading is *genialis*.

(si adversi fuerint) motum istum verum aëris disturbent. Quod ergo cœli terminis non contineatur iste motus, satis patet.

Sequitur ordine secunda inquisitio; *An aquæ ferantur regulariter et naturaliter ab oriente in occidentem?* Cum vero aquas dicimus, intelligimus aquas coacervatas, sive massas aquarum, quæ scilicet tantæ sunt portiones naturæ, ut consensum habere possint cum fabrica et structura universi. Atque arbitramur plane, eundem motum massæ aquarum competere atque inesse, sed tardiorem esse quam in aëre, licet ob crassitudinem corporis sit magis visibilis et apparens. Itaque ex multis quæ ad hoc adduci possent, tribus in præsens contenti erimus experimentis, sed iisdem amplis et insignibus, quæ rem ita esse demonstrant. Primum est, quod manifestus reperiatur motus et fluxus aquarum ab oceano Indico usque in oceanum Atlanticum, isque incitatior et robustior versus fretum Magellanicum, ubi exitus datur versus occidentem; magnum itidem ex adversa parte orbis terrarum a mari Scythico in mare Britannicum. Atque hæ consequentiæ aquarum manifesto volvuntur ab oriente in occidentem. In quo advertendum inprimis, in istis tantum duobus locis maria esse pervia et integrum circulum conficere posse; cum contra per medios mundi tractus, objectu duplici Veteris et Novi Orbis abscindantur et compellantur (tanquam in ostia fluminum) in duos illos alveos oceanorum geminorum Atlantici et Australis, qui oceani exporriguntur inter austrum et septentriones; quod adiaphorum est ad motum consecutionis ab oriente in occidentem. Ut verissime omnino capiatur motus verus aquarum ab istis quas diximus extremitatibus orbis, ubi non impediuntur, sed permeant. Atque primum experimentum hujusmodi est. Secundum autem tale.

Supponatur fluxum maris ad ostium freti Herculei fieri ad horam aliquam certam, constat accedere fluxum ad caput Sancti Vincentii tardius quam ad ostium illud; ad caput Finis-terræ tardius quam ad caput Sancti Vincentii; ad Insulam Regis tardius quam ad caput Finis-terræ; ad insulam Hechas tardius quam ad Insulam Regis; ad ingressum canalis Anglici tardius quam ad Hechas; ad littus Normannicum tardius quam ad ingressum canalis. Hucusque ordinatim; ad Gravelingam vero, verso prorsus ordine (idque magno saltu), quasi ad eandem horam cum ostio freti Herculei.[1] Hoc experi-

[1] These statements are taken from Nicolaus Sagrus, quoted by Patricius (*Pan-*

mentum secundum ad experimentum primum trahimus. Existimamus enim (quemadmodum jam dictum est), in mari Indico et in mari Scythico veros esse cursus aquarum, ab oriente scilicet in occidentem, pervios et integros; at in alveis maris Atlantici atque Australis compulsos et transversos et refractos ab objectu terrarum, quæ utrinque in longum ab Austro ad Boream exporriguntur, et nusquam, nisi versus extremitates, liberum dant exitum aquis. Verum compulsio illa aquarum, quæ causatur a mari Indico versus Boream, et in opposito a mari Scythico versus Austrum, spatiis immensum differunt ob differentem vim et copias aquarum. Universus igitur oceanus Atlanticus usque ad mare Britannicum cedit impulsioni maris Indici; at superior tantum Atlantici maris pars, nimirum ea quæ jacet versus Daniam et Norvegiam, cedit impulsioni maris Scythici. Hoc vero ita fieri necesse est. Etenim duæ magnæ insulæ veteris orbis et novi orbis eam sunt sortitæ figuram, atque ita exporriguntur, ut ad Septentriones latæ, ad Austrum acutæ sint. Maria igitur contra ad Austrum magna occupant spatia, ad Septentriones vero (ad dorsum Europæ et Asiæ atque Americæ) parva. Itaque ingens illa moles aquarum quæ venit ab oceano Indico et reflectit in mare Atlanticum, potis est compellere et trudere cursum aquarum continua successione quasi ad mare Britannicum, quæ successio est versus Boream. At illa longe minor portio aquarum quæ venit a mari Scythico, quæque etiam liberum fere habet exitum in cursu suo proprio versus occi-

cosmia, xxviii. p. 159.), and in Casmann's *Problemata Marina*, p. 165. "In die conjunctionis lunæ cum sole post mediam noctem horâ unâ cum dimidiâ, in freto Herculeo fluxus erit, et a Tariffa quæ finis freti est ad dexteram in sinum volvendo usque ad Ruttam eâdem horâ veniet. A Rutta ad Caput S. Mariæ accedet hora secunda cum quarto. A capite hôc ad Caput S. Vincentii, et ad dexteram flectendo toto Lusitano littore ad caput finis terræ, et inde ad orientem per totam Cantabricam oram, et etiam Gallicam usque ad regis insulam tribus post medinoctium horis mare erit plenum. Ab hac usque ad insulam Hechas in mari medio ad decimum fere milliarium, quod nautæ vocant derotam mare erit plenum horâ tertiâ cum tribus quartis. Sed in littoribus horâ quartâ cum dimidiâ. Ad Hebas [corrige Ab Hechis] usque ad ingressum canalis Anglici aqua plena hora quinta et quarto uno in derotâ. In littoribus hora sexta cum tribus quartis. Toto vero littore Normandico usque Caletum et Neuportum aqua plena horâ nonâ. In derotâ horæ unius tribus quartis. In Canali vero mediâ horâ duodecimâ in eâdem lunæ conjunctione. . . . . A Calete vero ad Gravelingen extra canalem Anglicum in derotâ plenum sit post mediam noctem una hora cum dimidiâ, qua plenum erat, uti vidimus ad Ruttam, hæc in gradu longitudinis est nono. Gravelinge vero in gradu xxiv. ut distent gradibus xv." There is no difficulty in identifying the places here mentioned (Rutta being, of course, Rota, and the insula Regis the Ile de Ré), except in the case of Hechas. It is, however, the same as Heys, which is the old name of Noirmoutier. (See Ortellius and Mercator.) The island probably obtained the name Noirmoutier from having a monastery of black friars. The old name seems to be revived now in the form Aix.

dentem ad dorsum Americæ, non potis est cursum aquarum compellere versus Austrum, nisi ad eam quam diximus metam, nempe circa fretum Britannicum. Necesse est autem ut in motibus istis oppositis sit tandem aliqua meta, ubi occurrant et conflictentur, atque ubi in proximo mutetur subito ordo accessionis; quemadmodum circa Gravelingam fieri diximus, limite videlicet accessionis Indicæ et Scythicæ. Atque inveniri Euripum quendam ex contrariis fluxibus circa Hollandiam, non solum ex ea (quam diximus) inversione ordinis horarum in fluxu, sed etiam peculiari et visibili experimento, a plurimis observatum est. Quod si hæc ita fiant, reditur ad id, ut necesse sit fieri, ut quo partes Atlantici et littora magis extenduntur ad Austrum et appropinquant mari Indico, eo magis fluxus antevertat in præcedentia, utpote qui oriatur a motu illo vero in mari Indico; quo vero magis ad Boream (usque ad limitem communem, ubi repelluntur a gurgite antistropho maris Scythici), eo tardius atque in subsequentia. Id vero ita fieri, experimentum istud progressus a freto Herculeo ad fretum Britannicum plane demonstrat. Itaque arbitramur etiam fluxum circa littora Africæ antevertere fluxum circa fretum Herculeum, et, verso ordine, fluxum circa Norvegiam antevertere fluxum circa Suediam; sed id nobis experimento aut historia compertum non est.

Tertium experimentum est tale: Maria clausa ex altera parte, quæ *Sinus* vocamus, si exporrigantur inclinatione aliqua ab oriente in occidentem, quæ in consequentia est cum motu vero aquarum, habent fluxus vigentes et fortes: si vero inclinatione adversa, languidos et obscuros. Nam et mare Erythræum habet fluxum bene magnum, et Sinus Persicus, magis recta petens occidentem, adhuc majorem. At mare Mediterraneum, quod est sinuum maximus, et hujus partes Tyrrhenum, Pontus, et Propontis, et similiter mare Balticum, quæ omnia reflectunt ad orientem, destituuntur fere, et fluxus habent imbecillos. At ista differentia maxime elucescit in partibus Mediterranei, quæ quamdiu vergunt ad orientem, aut flectunt ad septentriones (ut in Tyrrheno et in iis quæ diximus maribus), quiete agunt absque æstu multo. At postquam se converterint ad occidentem, quod fit in mari Adriatico, insignem recuperat[1] fluxum. Cui accedit et illud, quod in Mediterraneo refluxus ille tenuis (qualis invenitur) incipit ab oceano, fluxus a

[1] M. Bouillet corrects the passage by reading *recuperant*.

contraria parte, ut aqua magis sequatur cursum ab oriente quam refusionem oceani. Atque his tantum tribus experimentis in præsentia utemur ad inquisitionem illam secundam.

Possit tamen adjici probatio quædam consentanea cum his quæ dicta sunt, sed abstrusioris cujusdam naturæ; ea est, ut petatur argumentum hujusce motus ab oriente in occidentem quem aquis adstruximus, non solum a consensu cœli (de quo jam dictum est), ubi iste motus in flore est ac fortitudine præcipua, sed etiam a terra, ubi protinus videtur cessare; ita ut ista inclinatio sive motus vere sit cosmicus, atque omnia a fastigiis cœli usque ad interiora terræ transverberet. Intelligimus enim conversionem istam ab oriente in occidentem fieri scilicet (quemadmodum revera invenitur) super polos australem et borealem. Verissime autem diligentia Gilberti nobis hoc reperit; omnem terram et naturam (quam appellamus terrestrem) non delinitam sed rigidam, et, ut ipse loquitur, robustam, habere directionem sive verticitatem latentem, sed tamen per plurima exquisita experimenta se prodentem, versus Austrum et Boream.[1] Atque hanc tamen observationem plane minuimus, atque ita corrigimus, ut hoc asseratur tantum de exterioribus concretionibus circa superficiem terræ, et minime producatur ad viscera ipsius terræ (nam quod terra sit magnes interim levi omnino phantasia arreptum est; fieri enim prorsus nequit, ut interiora terræ similia sint alicui substantiæ quam oculus humanus videt, siquidem omnia apud nos a sole et cœlestibus laxata, subacta, aut infracta sint, ut cum iis quæ talem nacta sunt locum quo vis cœlestium non penetret neutiquam consentire possint); sed quod nunc agitur, superiores incrustationes sive concretiones terræ videntur consentire cum conversionibus cœli, aëris, atque aquarum, quatenus consistentia et determinata cum liquidis et fluidis consentire queant, hoc est, non ut volvantur super polos, sed dirigantur et vertantur versus polos. Cum enim in omni orbe volubili, qui vertitur super polos certos neque habet motum centri, sit participatio quædam naturæ mobilis et fixæ; postquam per naturam consistentem sive se determinantem ligatur virtus volvendi, tamen manet et intenditur et unitur virtus illa et appetitus dirigendi se; ut directio et verticitas ad polos in rigidis, sit eadem res cum volubilitate super polos in fluidis.

[1] Bacon appears to refer particularly to Gilbert, *De Magn.* vi. 4.; a passage repeated, like many others, in the *Physiol. Nova*, ii. 7.

Superest inquisitio tertia: *Unde et quomodo fiat reciprocatio illa sexhoraria æstuum, quæ incidit in quadrantem motus diurni, cum differentia quam diximus?* Id ut intelligatur, supponatur orbem terrarum universum aqua cooperiri, ut in diluvio generali. Existimamus aquas, quippe ut in orbe integro, neque impedito, semper in progressu se commoturas ab oriente in occidentem singulis diebus ad certum aliquod spatium (idque profecto non magnum, ob exsolutionem et enervationem virium hujus motus in confiniis terræ), cum ex nulla parte objectu terræ impediantur aquæ aut cohibeantur. Supponatur rursus, terram unicam insulam esse, eamque in longitudine exporrigi inter Austrum et Septentriones, quæ forma ac situs motum ab oriente in occidentem maxime frenat et obstruit; existimamus aquas cursum suum directum et naturalem ad tempus perrecturas, sed rursus ab insula illa repercussas paribus intervallis relapsuras; itaque unicum tantum fluxum maris in die futurum fuisse, et unicum similiter refluxum, atque horum singulis circiter 12 horas attributum iri. Atque ponatur jam (quod verum est et factum ipsum) terram in duas insulas divisam esse, veteris scilicet et novi orbis (nam Terra Australis situ suo rem istam non magnopere disturbat, quemadmodum nec Groenlandia aut Nova-zembla), easque ambas insulas per tres fere mundi zonas exporrigi, inter quas duo Oceani, Atlanticus et Australis, interfluunt, et ipsi nunquam nisi versus polos pervii; existimamus necessario sequi, ut duo isti obices naturam duplicis reciprocationis universæ moli aquarum insinuent et communicent, et fiat quadrans ille motus diurni; ut aquis scilicet utrimque frenatis, fluxus et refluxus maris bis in die, per spatia scilicet sex horarum, se explicet, cum duplex fiat processio, et duplex itidem repercussio. Illæ vero duæ insulæ si instar cylindrorum aut columnarum per aquas[1] exporrigerentur æquis dimensionibus et rectis littoribus, facile demonstraretur et cuivis occurreret iste motus, qui jam tanta varietate posituræ terræ et maris confundi videtur et obscurari. Neque etiam est difficile conjecturam capere nonnullam, qualem isti motui aquarum incitationem tribuere consentaneum sit, et quanta spatia in uno die conficere possit. Si enim sumantur (in æstimationem hujus rei) littora aliqua ex iis quæ minus montosa aut depressa sunt et oceano libero adjacent, et capiatur mensura spatii terræ inter metam fluxus et metam refluxus

[1] *quas* in the original. — *J. S.*

interjacentis, atque illud spatium quadruplicetur propter æstus singulis diebus quaternos, atque is numerus rursus duplicetur propter æstus ad adversa littora ejusdem oceani, atque huic numero nonnihil in cumulum adjiciatur, propter omnium littorum altitudinem, quæ ab ipsa fossa mari semper aliquantum insurgunt; ista computatio illud spatium productura est, quod globus aquæ uno die, si liber ab impedimento esset ac in orbe circa terram semper in progressu moveret, conficere possit; quod certe nil magnum est. De differentia autem illa quæ coincidit in rationes motus lunæ, et efficit periodum menstruam; id fieri existimamus, quod spatium sexhorarium non sit mensura exacta reciprocationis, quemadmodum nec motus diurnus alicujus planetarum non [1] restituitur exacte in horis 24, minime autem omnium luna. Itaque mensura fluxus et refluxus non est quadrans motus stellarum fixarum, qui est 24 horarum, sed quadrans diurni motus lunæ.

Mandata.

Inquiratur utrum hora fluxus circum littora Africæ antevertat horam fluxus circa fretum Herculeum? Inquiratur utrum hora fluxus circa Norvegiam antevertat horam fluxus circa Suediam, et illa [2] similiter horam fluxus circa Gravelingam?

Inquiratur utrum hora fluxus ad littora Brasiliæ antevertat horam fluxus ad littora Hispaniæ Novæ et Floridæ?

Inquiratur utrum hora fluxus ad littora Chinæ non inveniatur ad vel prope horam fluxus ad littora Peruviæ, et ad vel prope horam refluxus ad littora Africæ et Floridæ?

Inquiratur quomodo hora fluxus ad littora Peruviana discrepet ab hora fluxus circa littora Hispaniæ Novæ, et particulariter quomodo se habeant differentiæ horarum fluxuum ad utraque littora Isthmi in America; et rursus quomodo hora fluxus ad littora Peruviana respondeat horæ fluxus circa littora Chinæ?

Inquiratur de magnitudinibus fluxuum ad diversa littora, non solum de temporibus sive horis. Licet enim causentur fere magnitudines fluxuum per depressiones littorum, tamen nihilominus communicant etiam cum ratione motus veri maris, prout secundus est aut adversus.

[1] So in the original. — *J. S.*

[2] *ille* in the original. — *J. S.*

Inquiratur de mari Caspio, (quæ sunt bene magnæ portiones aquarum conclusæ, absque ullo exitu in oceanum,) si patiantur fluxum et refluxum, vel qualem ; siquidem nostra fert conjectura, aquas in Caspio posse habere fluxum unicum in die, non geminatum, atque talem ut littora orientalia ejusdem maris deserantur, cum occidentalia alluantur.

Inquiratur utrum fluxus augmenta in noviluniis et pleniluniis, atque etiam in æquinoctiis[1], fiant simul in diversis mundi partibus? Cum autem dicimus *simul*, intelligimus non eadem hora (variantur enim horæ secundum progressus aquarum ad littora, ut diximus), sed eodem die.

Moræ.

Non producitur inquisitio ad explicationem plenam consensus motus menstrui in mari cum motu lunæ; sive illud fiat per subordinationem, sive per concausam.

Syzygiæ.[2]

Inquisitio præsens conjungitur cum inquisitione, *utrum terra moveatur motu diurno?* Si enim æstus maris sit tamquam extrema diminutio motus diurni; sequetur globum terræ esse immobilem, aut saltem moveri motu longe tardiore quam ipsas aquas.

[1] *æquinoxiis* in the original. — *J. S.* [2] *Zyzygiæ* in the original. — *J. S.*

DE PRINCIPIIS ATQUE ORIGINIBUS,

SECUNDUM FABULAS

CUPIDINIS ET CŒLI:

SIVE

PARMENIDIS ET TELESII ET PRÆCIPUE DEMOCRITI PHILOSOPHIA,

TRACTATA IN

FABULA DE CUPIDINE.

PREFACE

TO

DE PRINCIPIIS ATQUE ORIGINIBUS.

BY ROBERT LESLIE ELLIS.

THE following tract is one of those which were published by Gruter. It seems to be of later date than many of the others, as it contains several phrases and turns of expression which occur also in the *Novum Organum*.

Bacon's design was to give a philosophical exposition of two myths; namely, that of the primeval Eros or Cupid, and that of Uranos or Cœlum. Only the first however is discussed in the fragment which we now have, and even that is left incomplete.

The philosophy of Democritus appeared to Bacon to be nearly in accordance with the hidden meaning of these fables; but we are not well able to judge of his reasons for thinking so, as the only system spoken of in detail is that of Telesius.

Touching the origin of Eros, Bacon remarks that no mention is made anywhere of his progenitors. In this he is supported by the authority of Plato, or rather by that of one of the interlocutors in the *Symposium*, who affirms that no one, whether poet or not, has spoken of the parents of Eros; but that Hesiod in the order of his theogony places Gaia and Eros next after primeval Chaos.[1] It seems in truth probable that the fables which make Eros the son of Zeus and Aphrodite are of later origin. From the *Symposium* Bacon may also have derived the recognition of an elder and a younger Eros, of whom the former was allied to the heavenly Aphrodite, and the latter

[1] Sympos. p. 178.; and see Valcknaer's Diatribe, to whom Stallbaum refers. On the other hand Pausanias mentions as an early myth that Eros was the son of Ilithyia. See Pausan. Bœot. ix. 27.

to Aphrodite Pandemus.[1] But it is more probable that his account of the distinction between them comes from some later writer.

Hesiod, to whom the first speaker in the *Symposium* refers, though he places Eros and Gaia next to Chaos, says nothing of Eros as the progenitor of the universe. His existence is recognised, but nothing is said of his offspring. In this the theogony of Hesiod differs essentially from that which is contained in the Orphic poems, and shows I think signs of greater antiquity. To recognise as a deity an abstract feeling of love or desire, is in itself to recede in some measure from the simplicity of the old world: we find no such recognition in Homer; and the transition from him to Hesiod is doubtless a transition from an earlier way of thinking to a later. But even in Hesiod Eros is not the producing principle of the universe, nor is his share in its production explained. On the other hand in the Orphic poems, Phanes, whom we are entitled to identify with Eros, is the progenitor of gods and men, the light and life of the universe. He comes forth from Chaos, uniting in his own essence the poles of the mysterious antithesis on which all organic production depends. From him all other beings derive their existence. There seems clearly more of a philosopheme in this than in the simpler statements of Hesiod.

The identification of Eros with Phanes or Ericapeus rests on a passage in the *Argonautics*, in which it is said that he was called Phanes by the men of later time because he was manifested before all other beings; *πρῶτος γὰρ ἐφάνθη*.[2] It is confirmed by the authority of Proclus.

Phanes, in the common form of the Orphic theogony, comes out of the egg into which Chaos had formed itself.[3] But I am not aware that any one except Aristophanes makes Night lay the egg from which Eros afterwards emerges[4]; and it seems that this is only a playful modification of the common myth, not unsuitable to the chorus of birds by whom it is introduced.[5] It does not appear necessary to suppose, as Cudworth seemingly does, that Aristophanes had in some unexplained way

[1] Sympos. p. 180., and see also p. 195.

[2] Orph. Argon. 14. In the preceding line, Eros is made, according to Gesner's reading, the son of Night. But for *νΐα* there is another reading, *πατέρα*.

[3] See Lobeck, Aglaoph. i. 474.

[4] Aves, 650.

[5] This seems to be confirmed by the half ludicrous epithet *ὀπηνέμιον*.

become acquainted with a peculiar form of "the old atheistic cabala."[1]

The most remarkable passage in which Eros (not Phanes) is spoken of as the producer of all things, is in the *Argonautics*:—

> πρῶτα μὲν ἀρχαίου χάεος μεγαλήφατον ὕμνον,
> ὡς ἐπάμειψε φύσεις, ὥς τ' οὐρανὸς ἐς πέρας ἦλθεν,
> γῆς τ' εὐρυστέρνου γένεσιν, πυθμένας τε θαλάσσης,
> πρεσβύτατόν τε καὶ αὐτοτελῆ πολύμητιν Ἔρωτα,
> ὅσσά τ' ἔφυσεν ἅπαντα, τὰ δ' ἔκριθεν ἄλλου ἀπ' ἄλλο.[2]

Nothing is said here, or elsewhere I believe, of his having mingled with Uranos in the engendering of the universe; and I am inclined to think that when Bacon says, "Ipse cum Cœlo mistus, et deos et res universos progenuit," we ought to substitute Chao for Cœlo.[3] For the passage in Aristophanes goes on to say that in wide Tartarus Eros and Chaos mingled in love and produced first the race of birds and then gods and men.

Of Phanes nothing of this kind is mentioned, except his intercourse with Night[4]; so that Bacon's statement does not seem to be in any way justified.

It would be endless to cite passages in which the attributes of Eros are described, nor is it necessary to do so.

The form in which Bacon connects the myth of the primeval Eros with philosophy is far less artificial and unreal than most of the interpretations which he has given in the Wisdom of the Ancients. Chaos represents uninformed matter; Eros matter actually existing, and possessed of the law or principle by which it is energised; the first principle, in short, which is the cause of all phenomena. The parents of Eros are unknown; that is to say, it is in vain to seek to carry our inquiries beyond the fact of the existence of matter possessed of such and such primitive qualities. On what do those primary qualities ultimately depend? On the "lex summa essentiæ atque naturæ . . . vis scilicet primis particulis a Deo indita, ex cujus multiplicatione omnis rerum varietas emergat et confletur." Whether this highest law can ever be discovered is

[1] See Cudworth, Intellect. Syst.

[2] Argonaut. 423. In the third line *πυθμένας* is admitted to be corrupt. I would venture to suggest *πολιᾶς*, making *θαλάσσης* the genitive case after *γένεσιν*.

[3] This conjecture is confirmed by the corresponding passage in the *De Sap. Vet.*, where for *cum cœlo mistus* we have *ex chao*. — *J. S.*

[4] Lobeck, i. 501. It is to this intercourse that the line quoted by Proclus refers:—

> Αὐτὸς ἐῆς γὰρ παιδὸς ἀφείλετο κούριον ἄνθος.

by Bacon left here as elsewhere doubtful; but he does not forbid men to seek for it. But what he utterly condemns is the attempt to make philosophy rise above the theory of matter. We must ever remember that Eros has no progenitors, "ne forte intellectus ad inania deflectat"—that we turn not aside to transcendental fancies; for in these the mind can make no real progress, and "dum ad ulteriora tendit ad proximiora recidit." We must of necessity take as the starting point of our philosophy, matter possessed of its primitive qualities; and this principle is in accordance with the wisdom of those by whom the myth of Eros was constructed. And certainly, Bacon goes on to say, "that despoiled and merely passive matter is a figment of the human mind;" a statement which refers to the Aristotelian doctrine in which the primitive ὕλη is not conceived of as a thing actually existing, but as that which first receives existence through the εἶδος, wherewith it is united. Of this doctrine Bacon asserts that it is altogether trifling: "For that which primarily exists must no less exist than that which thence derives its existence;" that is to say, matter must in itself exist actually and not potentially. And the same conclusion follows from the Scriptures, "wherein it is not said that God created hyle, but that he created heaven and earth."

This application of Scripture certainly does not deserve the indignation which Le Maistre, perhaps in honest ignorance, has poured out upon it.[1] "He asserts the eternity of matter," is Le Maistre's commentary on the passage in which it occurs. Beyond doubt he denies that hyle was created, but he also denies that it exists; treating it as the mere figment of the Aristotelian philosophy.

But although Le Maistre's remark is only a fair specimen of his whole work, in which ignorance and passion are so mixed together that it is hard to say how much is to be ascribed to the one and how much to the other, yet it cannot be denied that Bacon does not appear to have understood Aristotle. So far from putting at the origin of things that which is potential, and educing the actual from it, Aristotle asserts that any system which does this is untenable; and it is curious that he refers particularly to the theogonists, οἱ ἐκ νυκτὸς γεννῶντες, who

[1] Examen de la Philosophie de Bacon, ii. p. 143.

engender realities out of night.[1] For night and chaos may not unfitly be taken to represent uninformed matter.[2] The doctrine of Aristotle being in this as in other matters followed by the schoolmen, it was a question with them how the words "and the earth was without form," which come immediately after the declaration that in the beginning God created the heaven and the earth, ought to be understood. For to create the earth is to give it actual existence; how then can it be without form? To this the most satisfactory answer was that the words without form do not imply the absence of substantial form, failing which the earth could have no actual existence, but simply mean that as yet the earth was unadorned and in disorder; a solution in which we see how far they were from supposing that according to Aristotle the first created thing ought to be uninformed matter. They insist on the contrary that the Scripture cannot mean that any created thing can be mere matter: "non enim datur ens actu sine actu."

Aristotle, as I have said, condemns the theogonists in whose system Night is a producing principle,—a remark in which he may refer either to Hesiod or to the Orphic writers, but which probably relates to the former only. In the reason of this condemnation Bacon agrees with him, and yet takes into the myth which he proposes to explain, Aristophanes's fancy that the egg from which Eros came forth was laid by Night. His reason for doing so is that this part of the fable appears to him to relate not to essence but to cognition, that is to the method whereby we may arrive at a knowledge of Eros, or of the fundamental properties of matter. For conclusions obtained by means of affirmatives are, so to speak, brought forth by Light: whereas those which are obtained by negatives and exclusions are the offspring of Night and Darkness. Therefore the egg is laid by Night, seeing that the knowledge of Eros, though it is assuredly attainable, can yet only be attained by exclusions and negatives; that is, to express the same opinion in the language of the *Novum Organum*, the knowledge of Forms necessarily depends on the *Exclusiva*. That this method of exclusions must of necessity be ultimately successful is intimated by the myth itself; for the incubation of the pri-

[1] Arist. Metaph. xii. 6.

[2] See Brandis's Schol. in Aristot. p. 803., and for the remarks of Alexander Aphrodisiensis, Lobeck, Aglaoph. i. 488.

meval egg is not eternal. In due time the egg is hatched and Eros is made manifest. If it be asked what analogy there is between darkness and the method of exclusions, Bacon's answer is satisfactory,— that darkness is as ignorance, and that in employing the method of exclusions we are all along ignorant of that which at any stage of the process still remains unexcluded. It may again be asked why the method of exclusions is the only one whereby Eros may be disclosed,— a question to which Bacon suggests an answer by saying that Democritus did excellently well in teaching that atoms are devoid of all sensible qualities. Bacon's opinion seems therefore to be, that any method but a negative one would necessarily fail, because that which is sought bears no analogy to any of the sensible objects by which we are surrounded. The parable, he says, maintains throughout the principles of heterogeneity and exclusion: meaning by heterogeneity a strongly marked antithesis between the fundamental qualities of matter and the sensible qualities of which we are directly cognisant. In accordance with this he censures Democritus for departing from this principle in giving his atoms the downward motion of gravity and the impulsive motion (*motus plagæ*) which belong to ordinary bodies. Not only are atoms and bodies different as touching their qualities, but also in their motions.

In these views, which however do not show either that the method of exclusions is the only one which can succeed or that it will always do so, there is much which deserves attention. They show that Bacon had obtained a deep insight into the principles of the atomic theory. The earlier developments of this theory have always been encumbered by its being thought necessary, in order to explain phenomena, to ascribe to the atoms properties which in reality belong only to the bodies which they compose; that is, by its being thought necessary to break through Bacon's principle of heterogeneity. Thus the atoms have been supposed of definite sizes and figures, thereby resembling other and larger bodies, and to be perfectly hard and unyielding. When freed from these subsidiary hypotheses, the atomic theory becomes a theory of forces only, and of whatever ulterior developments it may be capable, these can only be introduced when it has assumed this form. The speculations of Boscovich do not mark the farthest point to which the atomic theory may be carried, but they were

nevertheless an essential step in advance, and altogether in accordance with what Bacon has here said, though in an obscure and somewhat abrupt manner. "We do well," remarks Leibnitz, "to think highly of Verulam, for his hard sayings have a deep meaning in them:" a judgment which may not improbably have had a particular reference to the views now spoken of. For Leibnitz's own monadism is in effect only an abstract atomic theory [1]: more abstract doubtless than any thing which Bacon had conceived of, but yet a system which might have been derived from that of Democritus by insisting on and developing Bacon's principle of heterogeneity. And again, in a different point of view, it seems not unlikely that Leibnitz perceived an analogy between his own doctrine and that of Bacon. In the earlier part of his philosophical life, Leibnitz was disposed to agree with the opinion common among the reformers of philosophy, that what Aristotle had said of matter, of form, and of mutation, was to be explained by means of magnitude, figure, and motion. This opinion he ascribes to all the reformers of the seventeenth century, mentioning by name Bacon and several others.[2] Thirty years afterwards, in giving some account of the history of his opinions, he says that he came to perceive, "que la seule considération d'une masse étendue ne suffisoit pas, et qu'il falloit employer encore la notion de la force, qui est très-intelligible, quoiqu'elle soit du ressort de la Métaphysique."[3] In introducing this notion of force, he conceived that he was rehabilitating the Aristotelian or scholastic philosophy, seeing "que les formes des Anciens ou Entelechies ne sont autre chose que les forces."[4] These primitive forces[5] being the constituent forms of substances, he supposed them, with one exception (founded on dogmatic grounds), to have been created at the beginning of the world. The "lex a Deo lata" at the creation "reliquit aliquod sui expressum in rebus vestigium," namely an efficacy, or form, or force, by virtue of which and in accordance with the divine precept all phenomena had been engendered.[6]

If we compare these expressions, which contain the fundamental idea of Leibnitz's philosophy, with those which have

[1] The monad, Leibnitz himself remarks, is a metaphysical point, or formal atom.
[2] Epist. ad Thomas. p. 48. of Erdmann's edition of Leibnitz's Phil. Works.
[3] Système nouveau, p. 124., Erdmann.
[4] Lettre à Bouvet, p. 146., Erdmann.
[5] Forces primitives, v. Syst. Nouv.
[6] See his De ipsâ Naturâ, p. 156.

already been quoted from the following tract, we shall I think perceive more than an accidental analogy between them. Leibnitz speaks of the primitive forces impressed by the divine word on created things, "ex quâ series phenomenorum ad primi jussûs præscriptum consequeretur,"—and Bacon of the "lex summa essentiæ et naturæ, vis scilicet primis particulis a Deo indita, ex cujus multiplicatione omnis rerum varietas emergat et confletur." It does not seem improbable that Leibnitz, who in the letter to Thomasius classes Bacon, so far as relates to the present subject, with Gassendi and Descartes, came afterwards to find in Bacon's language hints of the deeper view which he had himself been led to adopt, and which constitutes the point of separation between his system and the Cartesian. This supposition would at least be in accordance with the emphatic manner in which he has contrasted the physical theories of Descartes and Bacon, taking the former as a type of acuteness and the latter of profundity, and asserting that compared with Bacon, Descartes seems to creep along the ground.[1]

It may not be out of place here to remark that there are other traces of Bacon's influence on Leibnitz. In Erdmann's edition of his philosophical works, we find several fragmentary papers which Leibnitz wrote under the name of Gulielmus Pacidius. The title of one of these is "Gulielmi Pacidii Plus Ultra, sive initia et specimina scientiæ generalis de instauratione et augmentis scientiarum ac de perficiendâ mente rerumque inventione ad publicam fœlicitatem." Plus Ultra was the motto to Bacon's device of a ship sailing through the Pillars of Hercules, and the remainder of the title is both in tone and language clearly Baconian. The work itself was to have concluded with an exhortation "ad viros dignitate doctrinâque egregios de humanâ fœlicitate exiguo tempore, si velimus modo, in immensum augendâ."[2]

Another of these fragments contains some account of himself, or rather of Wilhelmus Pacidius, in which he mentions it as one of the happy incidents of his youth, that when he had perceived the defects of the scholastic philosophy the writings of several of the reformers came into his hands—among which

[1] Leibnitiana, vol. vi. p. 303., ed. Genev. 1768.—*J. S.*
[2] Leibnitz, ab Erd. p. 89.

he gives the first place to the "consilia magni viri Francisci Baconi Angliæ Cancellarii de augmentis Scientiarum."[1]

To return to the fable of Cupid. After interpreting the statement that all things come from Eros to mean that all phenomena must be referred to the fundamental and originally inherent properties of matter as the first ground of their production, Bacon goes on to say that next to the error of those who make formless matter an original principle, is the error of ascribing secondary qualities to primitive matter. This he expresses by saying that though Eros is endued with personality, he is nevertheless naked, "ita personatus[2] ut sit tamen nudus." Those who have committed the error of clothing him have either merely covered him with a veil, or have dressed him up in a tunic, or lastly have wrapped him round with a cloak.

These three errors are respectively the errors of those who have sought to explain everything by the transformations of one element as air or fire,—of those who assume a plurality of elements,—and of those who assume an infinity of first principles (the homœomeria of Anaxagoras), each possessed of specific properties.

Contrasted with these errors is the doctrine that there is one first material principle, "idque fixum et invariabile," and that all phenomena are to be explained, "per hujusmodi principii . . . magnitudines figuras et positiones,"—a statement which includes along with the old atomic theory every such hypothesis as the Cartesian. By those only who hold this opinion is Eros rightly displayed; they show him as he really is, "nativus et exutus."

In the interval between writing this tract and the *Novum Organum* Bacon's opinions seem to have undergone some change, as he has there condemned the atomists for asserting the existence of "materia non fluxa;" an obscure phrase, but which appears irreconcilable with the expression which I have just quoted—"fixum et invariabile."

However this may be, Bacon next procecds to enumerate the different forms of doctrine into which the doctrine of a

[1] Leibnitz, ab Erd. p. 91.

[2] The meaning of *personatus* appears from the phrase Bacon previously uses: "Cupidinis est persona quædam."

single element has been subdivided. The first principle or primitive matter has been asserted to be water, or air, or fire. Something is then said of the opinions of Thales, of Anaximenes, and of Heraclitus, and they are collectively commended for having given Eros but a single garment, that is, for having ascribed to primitive matter only a single form substantially homogeneous with any of the forms of secondary existences.

The Anaxagorean doctrine of an infinity of elements is then set aside as belonging to the interpretation of the fable of Cœlum, and thus Bacon comes to the doctrine of two opposing principles, with which the remainder of the tract is taken up. Parmenides, he observes, among the ancients, and Telesius in modern times, had made fire and earth, or heaven and earth, the two first principles.

In connecting together Telesius and Parmenides Bacon overlooked an essential point of difference. For the system of Telesius is merely physical, it deals only with phenomena, and seeks for no higher grounds of truth than the evidence of the senses. Parmenides, on the other hand, recognised the antithesis of *τὸ ὄν* and *τὸ φαινόμενον*, of that which exists and that which is apparent. His doctrine is ontological rather than physical, and he does not admit that phenomena have any connexion with real or essential truth. He seeks for a deeper insight into things than any which a mere "Welt-anschauung," a mere contemplation of the universe, could be made to furnish. The hypothesis which he framed to explain the phenomena by which we are surrounded, is with him a hypothesis merely, and though, like Telesius's, this hypothesis refers every phenomenon to the antagonism of heat and cold, yet it has a character of its own, inasmuch as in a way not distinctly conceivable it also serves to represent the metaphysical antithesis of *τὸ ὄν* and *τὸ μὴ ὄν*.

It is however to be remembered that with the ontological aspect of the philosophy of Parmenides Bacon has here no concern.

The fundamental notion of Telesius's system was doubtless suggested both to him and to Parmenides [1], by certain obvious

[1] The same notion is ascribed also to Hippo of Rhegium, and to others of the Greek philosophers. See *Pseudo-orig. Philos* (16.), for the fullest statement as to Hippo.

phenomena, and especially by the growth, decay, and reproduction of plants and animals. But it is essentially derived from the delight which the mind takes in every form of antithetic dualism, and especially in the idea of the reciprocal action of opposing forces. It comes from the same source as the love and strife of Empedocles, and as the good and evil principles of the Persian theology.

By the help of this notion, namely that heat and cold are the constituent principles of the universe, Telesius attempts to give general explanations of all phenomena, leaving it to others to study them in detail. The largeness of his plan and the grave eloquence with which it is set forth won for him some celebrity, notwithstanding the extreme obscurity of his style and the vagueness of his whole doctrine.

The academy of Cosenza (it was at Cosenza that Telesius was born) adopted his views, and both there and elsewhere men were for some time to be found who called themselves Telesiani. Spiriti, in his *Scrittori Cosentini*, gives a list of the disciples of Telesius; it contains however no name of much note, except that of Campanella, and the fame of Campanella rests much more on his moral and political speculations than on his defence of Telesius. Giordano Bruno and Patricius cannot be called disciples of Telesius, though the writings of both bear traces of his influence.[1] Among real students of nature it was not to be expected that so indefinite a system as that of Telesius could find much acceptance, and accordingly it is but seldom mentioned by scientific writers. Grassi, in the *Libra Astronomica*[2], seems to reproach Galileo with having taken some notion about comets from Cardan and Telesius; remarking that their philosophy was sterile and unfruitful, and that they had left to posterity "libros non liberos." To this Galileo answers that as for what Cardan and Telesius might have said on the matter in hand he had never read it, and it would seem as if he means to disclaim all knowledge

[1] The influence of Telesius on Bruno is not, I think, mentioned by historians of philosophy, yet there is no doubt of its existence. In the following passage the fundamental principle of Telesius is plainly assumed, mingled with ideas derived from Copernicus. "Così vien distinto l'universo in fuoco et acqua, che sono soggetti di doi primi principii formali et attivi, freddo et caldo. Que' corpi che spirano il caldo, son le sole, che per se stesso son lucenti et caldi; que' corpi che spirano il freddo son le terre." — *Cena di Cenere*, p. 174. of Wagner's edition.

[2] Published in 1618, with the pseudonym of Lotario Sarsi. It is incorporated in the new edition of Galileo's works, iv. p. 61.

of their writings. Though he protests against the argumentum ex consensu which Grassi brings against them, yet it is plain that he does so only to confute his opponent, and not because he thought them worthy of a greater fame than they had received. Even among the large class of men who are content to acquiesce in general views and are not careful to inquire whether these views are accurate or ill defined, Telesius's popularity could not last long. For he had left nothing for his followers to do. All that could be said in favour of his fundamental idea he had said himself, and any attempt to develop it further could only show how insecure a foundation it was built on. His works are however not undeserving of attention, even apart from the influence which they had on the opinions of Bacon. They show much of the peculiar character of mind which distinguishes southern from northern Italy, and which is yet more conspicuous in the writings of Campanella and of Vico: grave and melancholy earnestness, — a fondness for symbol and metaphor, and for wide-reaching but dreamy theories.

The first two books of his principal work, the *De Rerum Naturâ*, were published at Rome in 1565. The complete work was not published until 1586, only two years before his death.[1] In 1590 a number of tracts, some of which had appeared in his lifetime, were published by Antonius Persius, one of his chief disciples, with a dedication to Patricius, which seems to claim him as at least half an adherent to the Telesian philosophy.[2] For some account of Telesius's minor works I may refer to Spiriti's *Scrittori Cosentini*, or to what Salsi has said of them in Ginguené's *Histoire Littéraire de l'Italie*.[3]

Of Lotter's work, *De Vita et Scriptis B. Telesii*, Leipsic, 1733, I much regret that I only know what is said of it in the *Acta Eruditorum* for that year. It appears to contain much information not easily to be found elsewhere.

The view which Bacon gives of the doctrines of Telesius seems to have been much used and trusted by the historians

[1] It was reprinted in 1588, along with the *Contemplationes* of Mocenicus and the *Quæstiones Peripateticæ* of Cæsalpinus. The volume containing these three works is entitled "Tractationum Philosophicarum tomus unus," and is apparently not easily met with. It is this edition that I have been in the habit of using.

[2] This dedication is prefixed to the tract "De Mari."

[3] The account of Telesius in Ginguené was written by Salsi. See Ginguené, vii. p. 500.

of philosophy [1],—a natural result of the involved and obscure style in which they were originally propounded. Whether it is altogether an accurate representation of these doctrines may at least be doubted: it seems as if Bacon, in some matters of detail, mingles with what he finds in Telesius some further developments of his own. Perhaps he is in some measure influenced by his jural habits of thought, and tries in all fairness and equity to put a favourable construction on that on which he sits in judgment.[2] However this may be, I have certainly found it difficult to support all his statements by quotations from his author, and in some cases have noticed at least apparent discrepancies.

The tract ends abruptly with the discussion of the system of Telesius. A similar discussion of the atomic theory would have been of far greater interest, for Bacon's own opinions are much more closely connected with those of Democritus than with Telesius's, from whom he derived only isolated doctrines. The most important of these doctrines is that of the duality of the soul, of which and of its relation to the orthodox opinion I have elsewhere had occasion to speak.[3]

[1] See what Brucker says of Morhof and Sosellus, *Hist. Crit. Phil.* iv. 453.

[2] Bacon's own language suggests this impression. "Nos enim," he declares, "in omnium inventis summâ cum fide et tanquam faventes versamur." And that he does not conceive himself bound to minute accuracy in reproducing the opinions of the philosophers of whom he speaks, appears from several expressions: "Hujusmodi quædam de diversitate calorum a Telesio dicuntur;" "Hæc, aut iis meliora, cogitabant illi," &c.

[3] See General Preface, Vol. I. p. 49.—*J. S.*

DE PRINCIPIIS ATQUE ORIGINIBUS,

SECUNDUM FABULAS

CUPIDINIS ET CŒLI:

ETC.

Quæ de Cupidine sive Amore ab antiquis memorata sunt, in eandem personam convenire non possunt; quinetiam ab ipsis ponuntur Cupidines duo, et longo sane intervallo discrepantes; cum unus ex iis deorum antiquissimus, alter natu minimus fuisse diceretur. Atque de antiquo illo nobis in præsentia sermo est. Narrant itaque Amorem illum omnium deorum fuisse antiquissimum, atque adeo omnium rerum, excepto Chao, quod ei coævum perhibetur. Atque Amor iste prorsus sine parente introducitur. Ipse autem cum Chao [1] mistus, et deos et res universas progenuit. A nonnullis tamen ovo prognatus [2] incubante Nocte traditus est. Ejus vero attributa ponuntur diversa, ut sit infans perpetuus, cæcus, nudus, alatus, sagittarius. Vis autem ejus præcipua et propria ad corpora unienda valet: etiam claves ætheris, maris, et terræ ei deferebantur.

[1] *Cælo* in the original. For the grounds of the correction, see Preface, p. 67.—*J. S.*

[2] Kellgren, *De Ovo mundano* (Helsingfors, 1849), has collected the passages on the egg cosmogony in the Institutes of Menu, the Putanas, and certain Commentaries. He remarks that, so far as he is aware, no trace of the mythus occurs in the Vedas. It follows that he did not perceive any reference to it in the 129th hymn of the 10th book of the Rig Veda, with which he was certainly acquainted, as he has quoted a portion of Colebrook's translation of it. In this translation it is difficult to recognise even the germ of the mythus, but in that which has since been given by Max Müller it seems more easy to do so. It would be interesting to ascertain how far the mythus was developed at the time at which the older portions of the Rig Veda were composed. The subject may be said to have a natural interest at Helsingfors, as the egg cosmogony exists among the Finns. For the hymn referred to see Colebrook's *Miscellaneous Essays*, i. p. 34., and Müller's Addenda to Bunsen's *Hippolytus*, p. 140.

Fingitur quoque et celebratur alter Cupido minor, Veneris filius, in quem attributa antiquioris transferuntur, et propria multa adjiciuntur.

Fabula ista, cum sequenti de Cœlo, brevi parabolæ complexu proponere videtur *doctrinam de principiis rerum et mundi originibus*, non multum dissidentem ab ea philosophia quam Democritus exhibuit; nisi quod videatur aliquanto magis severa, et sobria et perpurgata. Ejus enim viri, licet acutissimi et diligentissimi, contemplationes gliscebant tamen, et modum tenere nesciæ erant, nec se satis stringebant aut sustinebant. Atque etiam hæc ipsa placita quæ in parabola delitescunt, quamvis paulo emendatiora, talia sunt qualia esse possunt illa quæ ab intellectu sibi permisso, nec ab experientia continenter et gradatim[1] sublevato, profecta videntur; nam illud vitium existimamus etiam prisca secula occupasse. In primis autem intelligendum est, quæ hic afferuntur conclusa et prolata esse ex authoritate rationis humanæ solummodo, et sensus fidem secuta: cujus jampridem cessantia et deficientia oracula merito rejiciuntur, postquam meliora et certiora mortalibus ex parte verbi divini affulserint. Itaque Chaos illud, quod Cupidini coævum erat, massam sive congregationem materiæ inconditam significabat. Materia autem ipsa, atque vis et natura ejus, denique principia rerum, in Cupidine ipso adumbrata erant. Ille introducitur sine parente, id est sine causa: causa enim effectus veluti parens est; idque in tropis familiare et fere perpetuum est, ut parens et proles causam et effectum denotent. Materiæ autem primæ, et virtutis atque actionis propriæ ejus, causa nulla esse potest in natura (Deum enim semper excipimus); nihil enim hac ipsa prius. Itaque efficiens nulla, nec aliquid naturæ notius; ergo nec genus, nec forma. Quamobrem quæcunque tandem sit illa materia atque ejus vis et operatio, res positiva est et surda, atque prorsus ut invenitur accipienda, nec ex prænotione aliqua judicanda. Etenim modus si sciri detur, tamen per causam sciri non potest, cum sit post Deum causa causarum, ipsa incausabilis. Est enim terminus quidam verus et certus causarum in natura: atque æque imperiti est et leviter philosophantis, cum ad ultimam naturæ vim et legem positivam ventum sit causam ejus requirere aut fingere, ac in iis quæ subordinata sunt causam non desiderare.[2] Quare

[1] *gradatum* in original. — *J. S*

[2] Compare *Nov. Org.* i. 48.

Cupido ab antiquis sapientibus ponitur in parabola sine parente, id est, sine causa. Neque nihil in hoc est; imo haud scimus an non res omnium maxima. Nil enim philosophiam peræque corrupit ac illa inquisitio parentum Cupidinis; hoc est, quod philosophi principia rerum quemadmodum in natura inveniuntur non receperunt et amplexi sunt, ut doctrinam quandam positivam, et tanquam fide experimentali; sed potius ex legibus sermonum et ex dialecticis et mathematicis conclusiunculis atque ex communibus notionibus et hujusmodi mentis extra naturam exspatiationibus ea deduxerunt. Itaque philosophanti quasi perpetuo hoc animo agitandum est, non esse parentes Cupidini, ne forte intellectus ad inania deflectat; quia in hujusmodi perceptionibus universalibus gliscit animus humanus, et rebus et se ipso abutitur, et dum ad ulteriora tendit ad proximiora recidit.[1] Cum enim, propter angustias suas, iis quæ familiariter occurrunt et quæ una et subito mentem subire et ferire possunt maxime moveri consuerit; fit ut cum ad ea quæ secundum experientiam maxime universalia sunt se extenderit, et nihilominus acquiescere nolit, tum demum, tanquam adhuc notiora appetens, ad ea quæ ipsum plurimum affecerint aut illaqueaverint se vertit, et ea ut magis causativa et demonstrativa quam ipsa illa universalia sibi fingit.

Itaque quod prima rerum essentia, vis, et Cupido, sine causa sit, jam dictum est. De modo vero ejus rei (quæ causam non recipit) videndum. Modus autem et ipse quoque perobscurus est; idque a parabola ipsa monemur, ubi eleganter fingitur Cupido, ovum Nocte incubante exclusum. Certe sanctus philosophus ita pronuntiat: *Cuncta fecit Deus pulchra tempestatibus suis, et mundum tradidit disputationibus eorum; ita tamen ut non inveniat homo opus quod operatus est Deus a principio usque ad finem.*[2] Lex enim summa essentiæ atque naturæ, quæ vicissitudines rerum secat et percurrit (id quod ex verborum complexu describi videtur, *opus quod operatus est Deus a principio usque ad finem*), vis scilicet primis particulis a Deo indita, ex cujus multiplicatione omnis rerum varietas emergat et confletur, cogitationem mortalium perstringere potest, subire vix potest. Aptissime autem refertur illud de ovo Noctis ad demonstrationes per quas Cupido iste in lucem editur. Quæ enim per affirmativas concluduntur, videntur partus lucis; quæ vero per negativas et exclusiones, ea tanquam

[1] Compare Nov. Org. i. 48.

[2] Eccles. iii. 11.

a tenebris et nocte exprimuntur et educuntur. Est autem iste Cupido vere ovum exclusum a Nocte; notitia enim ejus (quæ omnino haberi potest) procedit per exclusiones et negativas. Probatio autem per exclusionem facta, quædam ignoratio est, et tanquam *nox*, quoad id quod includitur; quare præclare Democritus atomos sive semina, atque eorum virtutem, nullius rei similia quæ sub sensum cadere posset asseruit; sed ea prorsus cæca et clandestina natura insignit. Itaque de ipsis pronuntiavit:

> Neque sunt igni simulata, neque ulli
> Præterea rei quæ corpora mittere possit
> Sensibus, et nostros adjectu tangere tactus:[1]

Et rursus de virtute eorum:

> At primordia gignundis in rebus oportet
> Naturam clandestinam cæcamque adhibere,
> Emineat ne quid, quod contra pugnet et obstet.[2]

Itaque atomi neque ignis scintillis, neque aquæ guttis, neque auræ bullis, neque pulveris granis, neque spiritus aut ætheris minutiis, similes sunt. Neque vis et forma eorum aut grave quiddam est aut leve, aut calidum aut frigidum, aut densum aut rarum, aut durum aut molle, qualia in corporibus grandioribus invcniuntur; cum istæ virtutes, et reliquæ id genus, compositæ sint et conflatæ. Neque similiter motus naturalis atomi aut motus ille est descensus, qui appellatur naturalis, aut motus illi oppositus (plagæ), aut motus expansionis et contractionis, aut motus impulsionis et nexus, aut motus rotationis cœlestium, aut quispiam ex aliis motibus grandiorum, simpliciter. Atque nihilominus et in corpore atomi elementa omnium corporum, et in motu et virtute atomi initia omnium motuum et virtutum insunt. Veruntamen in hoc ipso, nimirum de motu atomi, collato ad motum grandiorum, philosophia parabolæ a philosophia Democriti dissentire videtur. Democritus enim non omnino parabolæ tantum, sed et sibi quoque impar et fere contrarius reperitur, in iis quæ amplius ab eo circa hoc dicta sunt. Debuit enim motum heterogeneum atomo tribuere, non minus quam corpus heterogeneum et virtutem heterogeneam. Verum ille motus duos, descensus gravium et adscensus levium (quem per plagam sive percussionem magis gravium pellendo minus gravia in superius expediebat), delegit ex motibus gran-

[1] Lucret. i. 688. [2] Id. i. 779.

diorum, quos atomo ut primitivos communicaret.[1] Parabola autem heterogeneam et exclusionem ubique tuetur, tam substantia quam motu. At parabola ulterius innuit, harum de quibus diximus exclusionum finem aliquem et modum esse; neque enim perpetuo Nox incubat. Atque Dei certe proprium est, cum de ejus natura inquiritur per sensum, ut exclusiones in affirmativis non terminentur. Alia vero est hujus rei ratio; ea scilicet, ut post debitas exclusiones et negationes aliquid affirmetur et constituatur, et ut ovum quasi a tempestiva et matura incubatione excludatur; neque tantum ovum excludatur Nocte, sed etiam ex ovo excludatur persona Cupidinis; hoc est, ut non tantum educatur et extrahatur hujusce rei notio quædam ex ignoratione, verum etiam notio distincta et confusa.[2] Atque de demonstrationibus, quales eæ circa materiam primam esse possint, hæc habuimus quæ cum sensu parabolæ maxime convenire arbitramur. Veniendum igitur ad Cupidinem ipsum, materiam scilicet primam, et dotes ejus, quas tanta circumstat nox; et videndum quid parabola ad illam lucis afferat. Neque nos fugit, opiniones hujusmodi duras et fere incredibiles ad hominum sensus et cogitationes accedere. Atque ejus certe rei periculum jam factum esse plane cernimus in hac ipsa Democriti philosophia de atomis, quæ quia paulo acutius et altius in naturam penetrabat et a communibus notionibus erat remotior, a vulgo pueriliter accipiebatur; sed et philosophiarum aliarum quæ ad vulgi captum magis accedebant disputationibus, tanquam ventis, agitata et fere extincta est. Et tamen etiam ille vir suis temporibus summa admiratione floruit, et *Pentathlus* dictus est ob multiplicem scientiam[3], et inter omnes philosophos omnium consensu maxime physicus est habitus, ut Magi quoque nomen obtineret. Neque Aristotelis pugnæ et dimicationes (qui Ottomannorum more de regno suo philosophiæ anxius erat, nisi fratres trucidasset; cui etiam curæ erat, ut ex ejus verbis liquet, ne quid posteri scilicet dubitarent) tantum sua violentia, nec etiam Platonis majestas et solennia tantum reverentia potuerunt, ut

[1] "Cuncta necesse est
Aut gravitate sua ferri primordia rerum,
Aut ictu forte alterius." LUCRET. ii. 82.

But Democritus himself did not ascribe gravity to the atom, and in this as in some other points Bacon was misled by assuming that Lucretius always represents the opinions of Democritus. See Stobæus, Eclog. Phys. i. 15.

[2] So in the original. I suppose *minime*, or some equivalent word, has dropped out. M. Bouillet suggests the substitution of *nec* for *et*.— *J. S.*

[3] Diog. Laert. ix. 37. But see Mullach. Quæst. Democ. p. 54.

philosophiam hanc Democriti delerent. Sed dum illa Aristotelis et Platonis strepitu et pompa professoria in scholis circumsonarent et celebrarentur, hæc ipsa Democriti apud sapientiores, et contemplationum silentia et ardua arctius complexos, in magno honore erat. Certe in seculis illis Romanæ doctrinæ, illa Democriti et mansit et placuit; cum Cicero ejus viri ubique summa cum laude mentionem faciat, et non ita multo post præconium illud poëtæ, qui videtur ex temporis sui judicio (ut solent illi) de eo locutus esse, conscriptum sit et exstet,

> Cujus prudentia monstrat
> Magnos posse viros, et magna exempla daturos,
> Vervecum in patria crassôque sub aëre nasci.[1]

Itaque non Aristoteles aut Plato, sed Gensericus et Attila et barbari, hanc philosophiam pessundederunt. Tum enim, postquam doctrina humana naufragium perpessa esset, tabulæ istæ Aristotelicæ et Platonicæ philosophiæ, tanquam materiæ cujusdam levioris et magis inflatæ, servatæ sunt, et ad nos pervenerunt, dum magis solida mergerentur et in oblivionem fere venirent. Nobis vero digna videtur Democriti philosophia quæ a neglectu vindicetur, præsertim quando cum authoritate prisci seculi in plurimis consentiat. Primo itaque describitur Cupido ut persona quædam; eique attribuuntur Infantia, Alæ, Sagittæ, alia, de quibus sigillatim postea dicemus. Sed hoc interim sumimus; antiquos proposuisse materiam primam (qualis rerum principium esse potest) formatam et dotatam, non abstractam, potentialem, informem. Atque certe materia illa spoliata et passiva prorsus humanæ mentis commentum quoddam videtur, atque inde ortum, quia intellectui humano illa maxime esse videntur, quæ ipse potissimum haurit, et quibus ipse plurimum afficitur. Itaque fit ut formæ (quas vocant) magis existere videantur, quam aut materia aut actio: quod illa latet, hæc fluit; altera non tam fortiter impingitur, altera non tam constanter inhæret. Imagines autem illæ, contra, et manifestæ et constantes putantur; adeo ut materia illa prima et communis tanquam accessorium quiddam videatur, et loco suffulcimenti; actio autem quævis tanquam emanatio tantum a formâ; atquè prorsus primæ partes formis deferantur. Atque hinc fluxisse videtur formarum et idearum regnum in essentiis, materia scilicet addita quadam phantastica. Aucta etiam sunt ista superstitione nonnulla (errorem, intemperantiam[2], ut fit,

[1] Juv. x. 48. [2] [So in original.] The true reading is probably *intemperantiâ*.

secuta), et ideæ abstractæ quoque introductæ, et earum dignitates; tanta confidentia et majestate, ut cohors somniantium vigilantes fere oppresserit. Verum ista ut plurimum evanuerunt; licet alicui, nostro hoc seculo, curæ fuerit ea sponte inclinantia fulcire et excitare, majore ausu (ut nobis videtur) quam fructu.[1] Verum quam præter rationem materia abstracta principium ponatur (nisi obstent præjudicia) facile perspicitur. Formas siquidem separatas quidam actu subsistere posuerunt[2], materiam separatam nemo; ne ex iis qui eam ut principium adhibuerunt; atque ex rebus phantasticis entia constituere durum videtur ac perversum, neque inquisitioni de principiis consonum. Neque enim quæritur quomodo naturam entium commodissime cogitatione complectamur aut distinguamus, sed quæ sint vere entia prima et maxime simplicia ex quibus cætera deriventur. Primum autem ens non minus vere debet existere, quam quæ ex eo fluunt; quodammodo magis. Authupostaton[3] enim est, et per hoc reliqua. At quæ dicuntur de materia illa abstracta, non multo meliora sunt, quam si quis mundum et res ex categoriis et hujusmodi dialecticis notionibus, tanquam ex principiis, fieri asserat. Parum enim interest, utrum quis mundum fieri ex materia et forma et privatione dicat, an ex substantia et qualitatibus contrariis.[4] Sed omnes fere antiqui, Empedocles, Anaxagoras, Anaximenes, Heraclitus, Democritus, de materia prima in cæteris dissidentes, in hoc convenerunt, quod materiam activam, forma nonnulla, et formam suam dispensantem, atque intra se principium motus habentem, posuerunt. Neque aliter cuiquam opinari licebit, qui non experientiæ plane desertor esse velit. Itaque hi omnes mentem rebus submiserunt. At

[1] The allusion is apparently to Patricius, whose *Nova Philosophia* was published in 1593; a work long since so rare that Sorellus (apud Brucker, iv. 28.) says that a small library might be purchased for the price of this single book. See for an account of it Brucker, ubi modo.

[2] Angels are regarded by the schoolmen as forms not immersed in matter. Thus St. Thomas says, "Angeli sunt formæ immateriales."— *Sum. Theol.* i. q. 61. Even the soul of man is spoken of as a form "non penitus materiæ immersa;" a way of speaking probably employed for two reasons,—to save the possibility of the soul's separate existence, and to obviate the difficulty of the Scotists, that an unextended, or intense, form like the soul cannot give extension or corporeity. From this difficulty Duns Scotus deduced the existence of a "forma corporeitatis" distinct from the soul; a doctrine not to be confounded with that of Avicenna, who, from the impossibility of conceiving unextended matter, was led to assert the existence of a form of corporeity primitively inherent in all matter.

[3] The word *αὐθυπόστατος*, of which the Latin form ought to be authypostatus, is given by Stephanus, with a reference to Nicetas.

[4] Compare *De Augmentis*.

Plato mundum cogitationibus, Aristoteles vero etiam cogitationes verbis, adjudicarunt; vergentibus etiam tum hominum studiis ad disputationes et sermones, et veritatis inquisitionem severiorem missam facientibus. Quare hujusmodi placita magis toto genere reprehendenda quam proprie confutanda videntur. Sunt enim eorum, qui multum loqui volunt, et parum scire. Atque abstracta ista materia est materia disputationum, non universi. Verum rite et ordine philosophanti, naturæ plane facienda est dissectio non abstractio (qui autem secare eam nolunt, abstrahere coguntur), atque omnino materia prima ponenda est conjuncta cum forma prima, ac etiam cum principio motus primo, ut invenitur. Nam et motus quoque abstractio infinitas phantasias peperit, de animis, vitis, et similibus, ac si iis per materiam et formam non satisfieret, sed ex suis propriis penderent illa principiis. Sed hæc tria nullo modo discerpenda, sed tantummodo distinguenda; atque asserenda materia (qualiscunque ea sit) ita ornata et apparata et formata, ut omnis virtus, essentia, actio, atque motus naturalis, ejus consecutio et emanatio esse possit. Neque propterea metuendum, ne res torpeant, aut varietas ista quam cernimus explicari non possit; ut postea docebimus. Atque quod materia prima forma nonnulla sit, demonstratur a parabola in hoc, quod Cupidinis est persona quædam. Ita tamen ut materia ex toto, sive massa materiæ, quondam informis fuerit: Chaos enim informe; Cupido persona quædam. Atque hæc cum sacris literis optime conveniunt. Neque enim scriptum est quod Deus hylen[1] in principio creavit, sed cœlum et terram.

Subjungitur etiam descriptio nonnulla status rerum qualis fuerit ante opera dierum, in qua distincta mentio fit terræ et aquæ, quæ sunt nomina formarum; sed tamen quod massa secundum totum erat informis.[2] Verum introducitur in parabolam Cupido ita personatus, ut sit tamen nudus. Itaque post illos qui materiam ponunt abstractam, proxime (sed in contrarium) peccant illi qui eam ponunt non exutam. Atque de hac re quædam adspersimus in iis quæ de demonstrationibus quales in materiam primam conveniant, et de heterogenea ipsius materiæ, a nobis jam dicta sunt. At hic, quem nunc ingrediemur, est proprius ejus rei tractandæ locus. Videndum ergo ex iis qui principia rerum in materia formata fundaverunt, quinam sint illi qui formam materiæ tribuerint nativam et

[1] *Hymen* in the original.—*J. S.* [2] Compare St. Thomas, Sum. Theol. i. 66. 1.

nudam, et qui rursus superfusam et indutam. Inveniuntur autem omnino *quatuor opinantium sectæ*. Prima est eorum, qui unum quippiam asserunt rerum principium, diversitatem autem entium constituunt in natura ejusdem principii fluxa[1] et dispensabili. Secunda eorum, qui principium rerum ponunt substantia unicum, idque fixum et invariabile; diversitatem entium deducunt per hujusmodi principii diversas magnitudines, figuras, et posituras. Tertia eorum, qui plura constituunt rerum principia; et diversitatem entium ponunt in eorum temperamento et mistione. Quarta eorum, qui infinita aut saltem numerosa constituunt rerum principia, sed specificata et effigiata; quibus nihil opus ut comminiscantur aliquid quod res deducat ad multiplex, cum naturam jam a principio disgregent.[2] Inter quos secunda secta nobis videtur solummodo Cupidinem exhibere, ut est, nativum et exutum. Prima vero introducit eum tanquam velo discretum. Tertia tunicatum. Quarta etiam chlamydatum et fere sub larva. Atque de singulis pauca dicemus, ad meliorem parabolæ explicationem. Primo igitur, ex iis qui unum rerum principium statuerunt, neminem invenimus qui illud de Terra affirmaret. Obstabat scilicet terræ natura quieta et torpens et minime activa, sed cœli et ignis et reliquorum patiens, ne id cuipiam in mentem veniret asserere.[3] Attamen prisca sapientia Terram proximam a Chao ponit, Cœlique primo parentem, deinde nuptam; ex quo conjugio omnia.[4] Neque propterea hoc accipiendum, ac si veteres unquam statuissent terram principium essentiæ; sed principium vel originem potius schematismi sive systematis. Itaque hanc rem ad parabolam sequentem de Cœlo rejicimus, ubi de Originibus inquiremus; quæ est inquisitio, ad illam de Principiis, posterior.

At Thales Aquam principium rerum posuit.[5] Videbat enim materiam præcipue dispensari in humido, humidum in aqua. Consentaneum autem esse illud rerum principium ponere, in

[1] *fluxu* in the original.—*J. S.*

[2] In enumerating these four sects, Bacon alludes successiveiy to the Ionian physicists; to the atomists; to Parmenides, Teiesius, Empedocies, and many others; and iastly to Anaxagoras.

[3] This remark Bacon may have derived from Aristotie, *Metaph.* i. 7. However, Hippo of Rhegium, or rather Hippo the atheist who is probabiy the same person, made earth the principle of all things, at ieast according to the scholiast on Hesiod's *Theogony*. (See Heinsius's Hesiod, p. 237.) Others, however, give a different account of Hippo's opinions, and it is possibie that the scholiast's story was suggested to him merely by what Aristotie says of him in the third chapter of the same book.

[4] As I have remarked in the preface, reference is here made to Hesiod.

[5] Piutarch, De Piac. Philosoph. i. 3.

quo virtutes entium et vigores, præsertim elementa generationum et instaurationum, potissimum invenirentur. Genituram animalium humidam; etiam plantarum semina et nuclea, quamdiu vegetarent nec effœta essent, tenera et mollia. Metalla quoque liquescere et fluere, et esse tanquam terræ succos concretos, vel potius aquas quasdam minerales. Terram ipsam imbribus aut irrigatione fluviorum fœcundari et instaurari, nihilque aliud videri terram et limum, quam fæces et sedimenta aquæ. Et aërem planissime esse aquæ exspirationem atque expansionem. Quin et ignem ipsum non concipi, neque omnino durare aut ali, nisi ex humido et per humidum. Pinguedinem autem illam humidi, in qua flamma et ignis sustentantur et vivunt, videri quandam aquæ maturitatem et concoctionem. Corpus rursus et molem aquæ per universum, ut fomitem communem, dispertiri. Oceanum terræ circumfundi. Vim maximam aquarum dulcium subterraneam; unde fontes et fluvii, qui, venarum instar, aquas per terræ et faciem et viscera deportent. At immensas vaporum et aquarum congregationes in supernis esse, utque aliam quandam aquarum universitatem, utpote a qua inferiores aquæ, atque adeo oceanus ipse, reparentur et reficiantur. Etiam ignes cœlestes existimabat aquas illas et vapores depascere; neque enim aut sine alimento subsistere, aut aliunde ali posse; figuram autem aquæ, quæ in ejus particulis (guttis videlicet) cernitur, eandem cum figura universi esse, rotundam nempe et sphæricam; quin et undulationem aquæ, etiam in aëre et flamma, notari et conspici: motum denique aquæ habilem, nec torpescentem, nec præfestinum; numerosissimam autem piscium et aquatilium generationem. Sed Anaximenes Aërem delegit, quod unum esset rerum principium.[1] Nam si moles in constituendis rerum principiis spectanda sit, videtur aër longe maxima universi spatia occupare. Nisi enim detur vacuum separatum, aut recipiatur superstitio illa de heterogenea cœlestium et sublunarium; quicquid a globo terræ ad ultima cœli extenditur spatii, atque astrum aut meteorum non est, aërea substantia compleri videtur. Atque globi terrestris domicilium instar puncti ad cœli ambitum censetur. In æthere vere[2] ipso, quantula portio in stellis conspergitur? cum in citimis sphæris singulæ conspiciantur, in ultima, licet ingens earum numerus sit, tamen præ spatiis interstellaribus exiguum quiddam spatii

[1] Plutarch, l. c. [2] So in the original: probably a mistake for *verò*. — *J. S.*

sidereum appareat; ut omnia tanquam in vastissimo aëris pelago natare videantur. Neque parva est ea portio aëris et spiritus, quæ in aquis et cavis terræ locis sedem et moram habet; unde aquæ fluorem suum recipiunt. Quin et extenduntur quandoque et intumescunt; terræ autem non solum porositas sua accidit, sed etiam tremores et concussiones, evidentia signa venti et aëris inclusi. Quod si media quædam natura sit propria principiorum, ut tantæ varietatis possit esse susceptiva; ea prorsus in aëre reperiri videtur. Est enim aër tanquam commune rerum vinculum, non tantum quia ubique præsto est, et succedit, et vacua possidet, sed multo magis quod videtur esse naturæ cujusdam mediæ et adiaphoræ. Hoc enim corpus illud est, quod lucem, opacitatem, omniumque colorum tincturas, et umbrarum eclipses excipit et vehit; quod sonorum etiam harmonicorum, et (quod multo majus est) articulatorum, impressiones et signaturas motu accuratissimo discriminat; quod odorum differentias, non tantum generales illas suavis et fœtidi, gravis, acuti, et similium, sed proprias et specificatas, rosæ, violæ, subit nec confundit; quod ad celebres et potentissimas illas qualitates calidi, frigidi, etiam humidi, sicci, quodammodo æquum se præbet; in quo vapores aquei, halitus pingues, spiritus salium, metallorum fumi, suspensa volant; denique in quo radii cœlestes, et arctiores rerum consensus et discordiæ, secreto commeant et obmurmurant; ut sit aër veluti chaos secundum, in quo tot rerum semina agant, errent, tentent, atque experiantur. Postremo, si vim genialem et vivificantem in rebus consulas, quæ ad rerum principia manuducat eaque manifestet, etiam aëris potiores partes esse videntur; adeo ut aëris et spiritus et animæ vocabula usu nonnunquam confundantur. Idque merito, cum vitæ paulo adultioris (exceptis scilicet rudimentis illis vitæ in embryonibus et ovis) respiratio aliqua comes sit veluti individuus; adeo ut pisces concreta et conglaciata aquarum superficie suffocentur. Etiam ignis ipse, nisi ab aura circumfusa animetur, exstinguitur, nihilque aliud videtur quam aër attritus, irritatus, et incensus; quemadmodum aqua e contra videri possit aëris coagulum et receptus. Etiam terram perpetuo aërem exhalare, neque ut per aquam in formam aëris transitum faciat opus habere. Heraclitus vero magis acutus, sed minus credibilis, Ignem rerum principium posuit.[1] Neque enim naturam mediam,

[1] Plutarch, l. c.

quæ maxime vaga et corruptibilis esse solet, sed naturam summam et perfectam, quæ corruptionis et alterationis terminus quidam sit, ad rerum principia constituenda quæsivit. Videbat autem maximam rerum varietatem et perturbationem in corporibus solidis et consistentibus inveniri. Talia enim corpora organica esse possunt, et veluti machinæ quædam, quæ etiam ex figura innumeras variationes nanciscuntur, qualia sunt corpora animalium et plantarum. Etiam in his ipsis, ea quoque quæ organica non sunt, tamen si acutius introspiciantur, valde esse dissimilia reperiuntur. Quanta enim dissimilitudo inter partes animalium illas ipsas, quæ vocantur similares? cerebrum, humorem crystallinum, albuginem oculi, os, membranam, cartilaginem, nervum, venam, carnem, pinguedinem, medullam, sanguinem, sperma, spiritum, chylum, reliqua? etiam inter partes vegetabilium, radicem, corticem, caulem, folium, florem, semen, et similia? At fossilia organica non sunt certe, sed tamen et in una specie varie commista sunt, et ad invicem admodum copiosam varietatem ostendunt. Quamobrem basis illa diversitatis entium, ampla, lata, et exporrecta, in qua tantus rerum apparatus elucescit et obversatur, constitui videtur in natura solida et consistenti. Corpora vero liquorum vis schematismi organici plane deserit. Neque enim reperitur per totam istam naturam visibilem, aut animal aut planta in corpore mere fluido. Ergo numerosissima illa varietas a natura liquida abscinditur et subducitur. Manet nihilominus varietas non parva, ut in tanta diversitate fusilium, succorum, destillatorum, et hujusmodi, manifestum est. At in aëriis et pneumaticis corporibus arctatur multo magis varietas, et obducitur promiscua quædam rerum similitudo. Certe vis illa colorum et saporum, quibus liquores quandoque distinguuntur, omnino cessat; odorum vero manet, atque aliarum nonnullarum, ita tamen ut transeant, confundantur, et minus hæreant; adeo ut in universum quo magis ad ignis naturam fiat appropinquatio tantum de varietate depereat. At postquam ad ignis naturam ventum est, ejusque rectificati et purioris, omne organum, omnisque proprietas, omnis dissimilaritas exuitur, atque natura tanquam in vertice pyramidali in unum coire videtur, atque ad terminum actionis suæ propriæ pervenisse. Itaque incensionem sive ignescentiam pacem nominavit, quia naturam componeret; generationem autem bellum, quia ad multiplex deduceret.[1] Atque ut ista ratio (qua res a

[1] Diog. Laert. ix. 8.

varietate ad unum, et ab unitate ad varium, fluminis instar fluerent et refluerent) aliquo modo explicari posset; ignem ei densari et rarescere placuit, ita tamen ut *rarescentia* illa versus naturam igneam, actio esset naturæ directa et progressiva; *densatio* autem veluti retrogradatio naturæ et destitutio. Utrumque fato et certis periodis (secundum summam) fieri censebat: ut mundi istius, qui volvitur, futura sit quandoque conflagratio, et deinde instauratio, atque incensionis et generationis series perpetua et successio. Ordinem autem (si quis diligenter versetur in tenui ea quæ de hoc viro atque ejus decretis ad nos pervenit memoria) diversum statuit *incensionis* et *exstinctionis*. In scala enim incensionis, nihil ab iis quæ vulgata sunt dissentiebat; ut progressus rarescentiæ et extenuationis esset a terra ad aquam, ab aqua ad aërem, ab aëre ad ignem; at non idem decursus; sed ordinem plane invertebat.[1] Ignem enim per exstinctionem terram educere asserebat, tanquam fæces quasdam atque fuligines ignis; eas deinceps uditatem concipere et colligere, unde aquæ fiat effluvium, quæ rursus aërem emittat et exspiret; ut ab igne ad terram mutatio fiat in præceps, non gradatim.

Atque hæc, aut iis meliora, cogitabant illi qui unum rerum principium statuerunt, naturam simpliciter intuiti, non contentiose. Atque laudandi sunt, quod vestem unicam Cupidini tribuerint, id quod nuditati proximum est; atque hujusmodi vestem, quæ est (ut diximus) veli cujuspiam instar, non profecto telæ spissioris. Vestem autem Cupidinis appellamus formam aliquam materiæ primæ attributam, quæ asseratur esse cum forma alicujus ex entibus secundis substantialiter homogenea. Ista autem quæ de aqua, aëre, igne, ab istis asseruntur, non firmis admodum rationibus nixa, reprehendere non fuerit difficile; neque causa videtur cur de singulis disseramus, sed tantum in genere. Primo itaque videntur antiqui illi in inquisitione principiorum rationem non admodum acutam instituisse; sed hoc solummodo egisse, ut ex corporibus apparentibus et manifestis, quod maxime excelleret quærerent; et quod tale videbatur, principium rerum ponerent; tanquam per excellentiam, non vere[2] aut realiter. Putabant enim hujusmodi naturam dignam, quæ sola esse diceretur qualis apparet: cætera vero eandem ipsam naturam esse existimabant, licet

[1] Plutarch, l. c. Diogenes Laertius, however, does not support the statement of the text.

[2] *vero* in the original. — *J. S.*

minime secundum apparentiam; ut vel per tropum locuti, vel tanquam fascinati videantur, cum impressio fortior reliqua traxerit. At vere contemplantem, æquum se præbere oportet ad omnia, atque principia rerum statuere, quæ etiam cum minimis et rarissimis et maxime desertis quibuscunque entium conveniant, non tantum cum maximis et plurimis et vigentibus. Licet enim nos homines entia quæ maxime occurrunt maxime miremur, tamen naturæ sinus ad omnia laxatur. Quod si principium illud suum teneant non per excellentiam, sed simpliciter; videntur utique in duriorem tropum incidere; cum res plane deducatur ad æquivocum, neque de igne naturali aut naturali aëre aut aqua quod asserunt prædicari videatur, sed de igne aliquo phantastico et notionali (et sic de cæteris), qui nomen ignis retineat, definitionem abneget. Porro videntur et illi in eadem incommoda compelli, quæ assertores materiæ abstractæ subeunt. Ut enim illi materiam potentialem et phantasticam ex toto, ita et isti ex parte introducunt. Ponunt etiam materiam quoad aliquid (principium illud nempe suum) formatam et actualem; quoad reliqua tantum potentialem. Neque aliquid lucri fieri per istud genus principii unici videtur, magis quam per illud materiæ abstractæ; nisi quod habetur aliquid quod obversetur ad intellectum humanum, in quo cogitatio humana magis defigatur et acquiescat, et per quod notio principii ipsius paulo plenior sit, reliquorum omnium abstrusior et durior. Sed scilicet illa ætate *Prædicamenta* regnum non acceperant, ut potuisset principium illud naturæ abstractæ latere sub fide et tutela prædicamenti substantiæ. Itaque nemo ausus est confingere materiam aliquam plane phantasticam, sed principium statuerunt secundum sensum; aliquod ens verum; modum autem ejus dispensandi (liberius se gerentes) phantasticum. Nihil enim inveniunt, imo nec comminiscuntur, quo appetitu aut stimulo, aut quâ ratione, via, aut ductu, istud principium suum a se degeneret, et rursus se recipiat.[1] At cum tanti appareant per universum contrariorum exercitus, densi, rari, calidi, frigidi, lucidi, opaci, animati, inanimati, et aliorum plurimorum quæ se invicem oppugnant, privant, perimunt; hæc omnia ab uno quopiam rei materiatæ fonte manare putare, neque tamen ullum ejus rei modum ostendere, speculationis cujusdam attonitæ videtur, et inquisitionem deserentis. Nam si de re ipsa per sensum constaret,

[1] Compare Arist. Met. i. 3.

ferendum esset, licet modus esset in obscuro ; rursus si modus vi rationis erutus esset aliquis habilis et credibilis, discedendum fortasse ab apparentiis ; sed minime postulandum ut iis assentiamus, quorum nec entia per sensum manifesta, neque explicationes per rationem probabiles. Præterea, si unum esset rerum principium, debuerat ejus conspici in omnibus rebus nota quædam, et tanquam partes potiores, et prædominantia nonnulla ; neque inveniri principatum ullum, quod principio ex diametro opponatur. Etiam in medio collocari debuerat, ut omnibus commodius sui copiam faceret, et per ambitum se diffunderet. At horum nihil esse in illis placitis invenitur. Nam terra, quæ a principii honore separatur et excluditur, videtur suscipere et fovere naturas illis tribus principialibus oppositas, cum ad mobilitatem[1] et lucidam naturam ignis, opponat naturam quietam et opacam ; ad tenuitatem et mollitiem aëris, opponat similiter naturam densam et duram ; et ad humiditatem et sequacitatem aquæ, naturam siccam, rigidam, et asperam ; atque ipsa quoque terra medium locum occuparit, cæteris deturbatis. Porro, si unicum esset rerum principium, debuerat et illud tum ad rerum generationem, tum ad earum dissolutionem, æquam præbere naturam. Tam enim est principii, ut res in illud solvantur, quam ut res ex illo gignantur. At hoc non fit ; sed ex iis corporibus aër et ignis ad materiam generationis præbendam inepta videntur, ad eorum resolutionem excipiendam parata. At aqua contra ad generationem benigna et alma ; ad resolutionem sive restitutionem magis aliena et aversa ; id quod facile cerneretur, si imbres paulisper cessarent. Quin et putrefactio ipsa nullo modo res ad aquam puram et crudam redigit. Sed longe maximus error, quod constituerunt principium corruptibile et mortale. Id enim faciunt, cum principium introducunt tale, quod naturam suam in compositis deserat et deponat.

> Nam quodcunque suis mutatum finibus exit,
> Continuo hoc mors est illius, quod fuit ante.

Verum hac ratione magis nobis opus erit statim, cum ad illam tertiam sectam, quæ plura decrevit rerum principia, sermo jam ordine devectus sit ; quæ certe secta plus roboris habere videri possit, plus præjudicii certe habet. Itaque ad opiniones non secundum genus et in communi, sed singulas accedemus.

[1] *nobilitatem* in the original. A similar mistake occurs at the end of the *Thema Cœli ;* which Mr. Ellis was the first to observe. — *J. S.*

[2] Lucret. iii. 518.

Itaque ex iis qui plura principia dixerunt, separabimus eos qui infinita asserunt. Ille enim locus de infinito ad parabolam Cœli pertinet. Verum ex antiquis Parmenides duo rerum principia, ignem et terram, dixit, sive cœlum et terram.[1] Solem enim et sidera verum ignem esse asseruit, eumque purum et limpidum[2], non degenerem, qualis apud nos est ignis, qui tanquam Vulcanus in terram dejectus ex casu claudicat. Parmenidis vero placita instauravit seculo nostro Telesius, vir peripateticis rationibus (si aliquid illæ essent) potens et instructus, quas etiam in illos ipsos vertit; sed affirmando impeditus, et destruendo quam astruendo melior. Ipsius vero Parmenidis inventorum parca admodum et perexilis memoria. Attamen fundamenta similis opinionis plane jacta videntur in libro quem Plutarchus de primo frigido conscripsit; qui tractatus videtur ex aliquo tractatu antiquo, qui tunc temporis exstabat, jam periit, descriptus et desumptus. Habet enim non pauca et acutiora et firmiora, quam solent esse authoris ipsius qui ea vulgavit; a quibus monitus atque excitatus videtur Telesius, ut ea et studiose arriperet et strenue persequeretur in suis de Natura Rerum commentariis. Placita autem hujus sectæ sunt hujusmodi. Primas formas ac prima entia activa, atque adeo primas substantias, calorem et frigus esse[3]; eadem nihilominus incorporea existere; sed subesse materiam passivam et potentialem, quæ corpoream molem præbeat, atque sit utriusque naturæ ex æquo susceptiva, ipsa omnis actionis expers.[4] Lucem pullulationem caloris esse[5], sed caloris dissipati, qui coëundo multiplicatus, fit[6] robustus et sensibilis.[7] Opacitatem similiter destitutionem et confusionem naturæ radiantis ex frigore.[8]

[1] This opinion, or something analogous to it, was held by many of the older physicists. (See Karsten's Parmenides, p. 230.) Beside those whom Karsten mentions, we know that Hippo Rheginus is said to have made fire and earth, or heat and cold, his first principles. (See Pseudo-Origen. Philosoph. c. 16.)

[2] Stobæus, Eclog. Phys. i. 23.

[3] "Patet calorem et frigus agentia rerum omnium principia esse."—*De Rer. Nat.* i. 3.

[4] "Calorem frigusque incorporeum esse: rerum omnium principia tria esse, agentes naturas duas incorporeas et quæ illas suscipit corpoream unam, et omnis ipsam actionis omnisque expertam esse operationis."—*Ib.* i. 4.

"Materia æque ad calorem ac ad frigus suscipiendum apta facta est."—*Ib.* l. c.

[5] "Candor . . . nequaquam res a calore sejuncta, et alius a calore, sed si non calor ipse ipsius certe species et veluti facies est."—*Ib.* i. 1.

[6] *sit* in orig.

[7] "Patet . . . . albedinem nec eam modò quæ . . . . quod sese assidue amplificat, et quaquaversus effundit . . . . per se visilis est, et lux dicitur, sed quæ veluti torpet . . . . et non lux sed albedo dicitur . . . a solis calore in quibus spectatur rebus omnibus inditam, illiusque speciem et veluti faciem esse."—*Ib.* i. 2.

[8] The opposite to albedo, of which light is the concentration, is nigredo, and this is not ascribed by Telesius to cold, but to matter. "Nigredo omnino . . . cùm

Rarum et Densum caloris et frigoris texturas et veluti telas esse; calorem vero et frigus eorum effectores et opifices, densante opus frigore et inspissante, divellente autem calore et extendente.[1] Ex ejusmodi texturis indi corporibus dispositionem erga motum, vel habilem vel aversam, Raris videlicet promptam et habilem, Densis torpescentem et aversam. Itaque calorem per tenue motum excitare et peragere, frigus per densum motum compescere et sedare. Quare esse et poni quatuor naturas coessentiales atque conjugatas, easque duplices, ordinem eum quem diximus ad invicem servantes (fons enim calor et frigus, cæteræ emanationes); sed tamen perpetuo concomitantes et inseparabiles. Eas esse, Calidum, Lucidum, Rarum, Mobile. Et quatuor rursus his oppositas, Frigidum, Opacum, Densum, Immobile. Sedes vero et contignationes primæ conjugationis, in cælo, sideribus, ac præcipue in sole statui; secundæ in terra.[2] Cœlum enim e summo integroque calore et materia maxime explicata esse calidissimum, lucidissimum, tenuissimum, maxime mobile. Terram contra, ex frigore integro et irrefracto et materia maxime contracta, frigidissimam, tenebricosissimam, densissimam, penitus immobilem, ac summopere motum exhorrentem.[3] Summitates vero cœli naturam suam integram atque illæsam servare, diversitatem nonnullam inter se admittentes, sed a contrarii violentia et insultu penitus semotas[4]: similem

. . . calori quod albus sui naturâ visus sit assignari nequeat, minus etiam frigori, quod iis plerumque inest entibus quæ bene calida sunt, superest ut materiæ assignanda sit."—*De Rerum Nat.* i. 4. Bacon's tendency throughout is to make the antagonism of heat and cold more symmetrical than it is with Telesius, who retains something of the Parmenidean view, in which heat is the active principle, and cold in a manner passive,—the relation between them being symbolised by that of the sexes.

[1] "Calor quivis . . . quæ corripit exuperatque immutare videtur, frigus scilicet ex iis, ejusque facultates conditionesque omnes crassitiem, obscuritatem, immobilitatem deturbare, et se ipsum iis propriasque facultates conditionesque omnes—tenuitatem albedinem et mobilitatem indere."—*Ib.* i. 1. But although Telesius asserts "calorem unius modo tenuitatis opificium esse,"—meaning that it produces "crassities" only per accidens, yet he nowhere says, I think, that "mobilitas" is the result of tenuity and not the direct effect of the action of heat. (See De Rer. Nat. i. 7.) On the contrary, he says, "Calorem sui naturâ mobilem, frigus contra immobile esse;" and again, that "agentes operantesque naturæ, calor nimirum frigusque moli cui sese induut, unum prorsus fiunt."—*Ib.* i. 2.

[2] "Liceat . . . uno in sole et stellas reliquas et universum intueri cœlum."—*Ib.* i. 11. "Omnino calidus tenuis candidus mobilisque est sol."—*Ib.* i. 1. "Nec vero sol modo, sed et stellæ reliquæ omnes et cœlum itidem universum . . . ab eâdem quâ Sol naturâ et a calore omnino constitutum videtur."—*Ib.* i. 3.

"Terra contra frigida, crassa, immobilis, tenebricosaque."—*Ib.* i. 1.

[3] "Sol, cœlumque universum . . . propterea perpetuo circumvolvitur, quod ipsius opifex calor circulari assidue commotus motu, molem cui penitus infixus est . . . secum agit. Sic itidem et Terra immobilis in sublimi permanet . . . quod frigus a quo constituta est . . . nullo moveri potest motu."—*Ib.* i. 2.

[4] "Sol modo terraque . . nec fieri unquam nec unquam immutari, entia vero reliqua assidue fieri assidueque immutari corrumpique videntur. Patet entia reliqua

per ima sive intima terræ constantiam esse; extrema tantum, ubi contrariorum sit appropinquatio et concursus, laborare, et ab invicem pati et oppugnari. Cœlum itaque tota mole et substantia calidum, et omnis contrariæ naturæ prorsus expers, sed inæqualiter; aliis partibus scilicet magis calidum, aliis minus. Stellarum enim corpus intensius calidum, interstellare remissius; quin et[1] stellis ipsis alias aliis ardentiores, et ignis magis vividi et vibrantis: ita tamen ut contraria natura frigoris, aut aliquis ejus gradus, nunquam eo penetret; recipere enim diversitatem naturæ, contrarietatem non recipere.[2] Neque vero de calore aut igne cœlestium, qui est integer et nativus, ex igne communi judicium omnino fieri. Ignem enim nostrum extra locum suum, trepidum, contrariis circumfusum, indigum, et stipem alimenti, ut conservetur, emendicantem, et fugientem[3]; at in cœlo vero locatum, ab impetu alicujus contrarii disjunctum, constantem, ex se et similibus conservatum, et proprias operationes libere et absque molestia peragentem. Item cœlum omni parte lucidum, sed secundum magis et minus. Cum enim sint ex stellis notis et numeratis quæ nisi cœlo sereno conspici non possint, atque in galaxia sint nodi minutarum stellarum quæ albedinem quandam conjunctæ, non corpus lucidum distinctæ repræsentent; nemini dubium esse posse, quin et sint stellæ complures quoad nos invisibiles; atque adeo universum cœli corpus luce prædituum sit, licet fulgore non tam robusto et vibrante, nec radiis tam confertis et constipatis, ut tanta spatia distantiarum vincere queat, et ad nostrum aspectum pervenire.[4] Ita rursus cœlum universum ex substantia tenui et rara, nil in ea contrusum, nil illibenter compactum, sed tamen alia parte materiam magis ex-

omnia a sole terram oppugnante invertenteque (repugnante et contra agente terrâ) effecta esse."—*De Rer. Nat.* i. 11.

[1] So in the original. We should apparently read *ex* for *et*.—*J. S.*

[2] "Una terra excepta, reliquorum entium nullum prorsus a frigore, sed . . . a calore constituta sunt omnia. . . . Non sensus modò, ratio, omnium fere veterum physicorum consensus, sed divinæ etiam literæ cœlum calidum testantur. . . Nullum porro, nec infima nec suprema cœli portio ad nos calorem, nullamque emittere videtur lucem, quod in longe utrâque tenuissimâ perexiis inest calor."—*De Rer. Nat.* i. 3.

[3] "Flammas, quæ nutrimento absumpto perierunt, in non ens abiisse existimare non contingit, in summam proindeque et invisilem tenuitatem actas, et ab insidente calore sursum elatas esse, existimandum est."—*Ib.* i. 1.

[4] "Eadem illius (solis) stellarumque et cœli universi natura conditiones reliquæ omnes, at (the text is *aut*) hujus vires, conditionesque reliquæ, multæ robustiores nobisque manifestioresque sunt."—*Ib.* i. 11. "Lactea . . via . . quin cœli portio sit paululo quid quam reliquum est magis conspissata et propterea splendidior facta nulli dubium esse potest."—*Ib.* i. 3. Observe that nothing is said of stars in the Milky Way. "Ab ipsis (supremis et infimis cœli portionibus) lucem quandam emanare, et quæ . . . quibusdam animalium generibus percipiatur, quæ longissima noctu conficiunt itinera declarant."—*Ib.* l. c.

plicatam, alia minus explicatam sortiri.[1] Postremo, motum cœli cum inveniri qui rei maxime mobili competat, conversionis nimirum sive rotationis. Motus enim circularis absque termino est, et sui gratia. Motus in linea recta, ad terminum et ad aliquid, et tanquam ut quiescat.[2] Itaque universum cœlum motu circulari ferri, nec ullam ejus partem hujus motus expertem esse; sed tamen quemadmodum et in calore et in luce et raritate cœli versatur inæqualitas, ita et in motu eandem notari; adeoque magis insigniter, quia observationem humanam magis lacessit et sustinet, ut etiam calculos pati possit.[3] Motum autem orbicularem et incitatione differre posse et latione; incitatione[4], ut sit celerior aut tardior; latione, ut sit in circulo perfecto, aut aliquid habeat spiræ neque se plane restituat ad eundem terminum (nam linea spiralis ex circulo et recta composita est). Itaque hæc ipsa cœlo accidere, varietatem nempe incitationis, et deflexionem a restitutione, sive spiralitatem.[5] Nam et stellæ inerrantes et planetæ impariter properant; et planetæ evidenter a tropico in tropicum deflectunt; atque quo sublimiora cœlestia sunt, eo et majorem incitationem sortiuntur, et propiorem spiram. Nam si phænomena simpliciter atque ut conspiciuntur accipiantur, et ponatur motus diurnus unus naturalis et simplex in cœlestibus, et formositas illa mathematica (ut motus reducantur ad circulos perfectos) contemnatur, et recipiantur lineæ spirales, et contrarietates illæ motuum in consecutione ab oriente in occidentem (quem vocant primi mobilis), et rursus ab occidente in orientem (quem vocant motum proprium planetarum) rediganter in unum, salvando differentiam temporis in restitutione per præfestinationem et derelictionem, et diversam politatem zodiaci per spiras; manifestum est, hoc quod diximus evenire: exem-

[1] "Summâ universum (cœlum) tenuitate summâque donatum esse albedine, lux . . . manifeste declarat."— *De Rer. Nat.* i. 3.

[2] Telesius gives no other reason than the following. "Sol, cœlumque universum propterea perpetuo circumvolvitur, quod ipsius opifex calor circulari assidue commotus motu molem cui penitus infixus est . . secum agit."— *Ib.* i. 2. The motions of the heavens and their construction he afterwards seeks to explain on teleological grounds which Bacon does not notice, but which are a prominent part of Telesius's system. See *De Rer. Nat.* l. 9. 10., and comp. the physiological speculations in the sixth book.

[3] Telesius does not attempt to connect the inequality of heat with that of motion, declaring—"non modum, quo qualis est, constructus sit mundus, sed cur ita construendus fuerit, et cur quibus cœlum movetur motibus iis moveri oportuerit, inquirendum esse."—*Ib.* i. 9.

[4] In the original *et* is repeated before *incitatione*. — *J. S.*

[5] Telesius says that the special hypotheses of astronomy are foreign to his purpose; his leaning is however in favour of the doctrine here ascribed to him, and which we know from Tassoni was adopted by his disciples. See the preface to the *Descriptio Globi Intellect.* and *De Rer. Nat.*, ubi modo.

pli gratia, ut luna, quæ est planetarum infima, incedat et tardissime et per spiras maxime raras et hiantes. Atque talis quædam natura portionis illius cœli quæ fit (propter distantiam a contrario) firma et perpetua, huic sectæ videri possit. Utrum vero veteres terminos servarit Telesius, ut talia esse putaret quæcunque supra lunam collocantur, cum luna ipsa, an altius vim inimicam adscendere posse, perspicue non ponit. At terræ (quæ est oppositæ naturæ contignatio et sedes) portionem itidem maximam intemeratam et inconcussam statuit, et quo cœlestia non penetrent. Eam[1] vero qualis sit, non esse cur inquiratur, ait. Sat esse ut quatuor illis naturis, frigiditate, opacitate, densitate, et quiete, iisque absolutis et nullatenus imminutis, dotata judicetur. Partem autem terræ versus superficiem ejus, veluti quendam corticem aut incrustationem, generationi rerum assignat[2]; omniaque entia quæ nobis quovis modo innotuerunt, etiam ponderosissima, durissima, et altissime demersa, metalla, lapides, mare, ex terra per calorem cœli aliqua ex parte versa et subacta, et quæ nonnihil caloris, radiationis, tenuitatis, et mobilitatis jam conceperit, et denique ex media inter solem et terram puram natura participet, consistere.[3] Itaque necesse est, ut terra illa pura infra profundissima maris, minerarum[4], et omnis generati deprimatur; et a terra illa pura usque ad lunam, aut altiora fortasse, media quædam natura ex temperamentis et refractionibus cœli et terræ collocetur. Postquam autem interiora utriusque regni satis muniisset, expeditionem et bellum molitur. Nam in spatiis illis intra extima cœli et intima terræ, omnem tumultum et conflictum et tartarismum inveniri, ut fit in imperiis, in quibus illud usuvenit, ut fines incursionibus et violentiis infestentur, dum interiores provinciæ secura pace fruuntur. Has itaque naturas et earum concretiones, sese assidue generandi et multiplicandi et quaquaversus offundendi, et molem materiæ universam occupandi, et sese mutuo oppugnandi et invadendi, et propriis

[1] So in the original; a mistake apparently for *ea*. — *J. S.*

[2] "Extrema tantum utriusque (cœli et terræ) portio (siquidem et extremi hujus cœli pars ulla in aliud unquam agitur ens) in entia, in quæ assiduè agi videtur, immutari possit: reliqua utriusque moles in propriâ servari queat naturâ."—*De Rer. Nat.* i. 10.

[3] "Non perpetuo agit Sol, sed agere interdum cessat, et dum agit non iisdem perpetuo sed aliis atque aliis agit viribus: . . . non quotidiano tantùm . . . agit calore. . . , sed eo insuper . . . quem jam diu terris indidit atque indit. . . . . Robustior factus solis calor, strenuè supremam terræ portionem emollit laxatque, et strenuè præexistentem ei calorem fovet . . . . . materiam nactus longe minus repugnantem."— *Ib.* i. 13.

[4] *mineranem* in the original. — *J. S.*

se sedibus deturbandi et ejiciendi, et sese in iis constituendi, præterea et alterius naturæ vim et actiones, et proprias etiam, percipiendi et prehendendi, et ex hujusmodi perceptione se movendi et accommodandi, appetitum et facultatem habere; atque ex ista decertatione, omnium entium atque omnis actionis et virtutis varietatem deduci.[1] Videtur tamen alicubi, licet titubanter et strictim, aliquid dotis materiæ impertiri; primo ut non augeatur nec minuatur per formas et activa entia, sed summa universali constet[2]: deinde ut motus gravitatis sive descensus ad illam referatur[3]; etiam quiddam de nigredine materiæ injicit.[4] Illud autem perspicue; calorem et frigus eadem vi et copia, in materia explicata vires remittere, in complicata intendere, cum mensuram non suam sed materiæ impleant.[5] Modum vero excogitat atque explicat Telesius, quo ex hoc certamine et lucta induci atque expediri possit tam fœcunda et multiplex entium generatio. Ac primo cavet terræ, inferiori scilicet principio, ac ostendit quid in causa sit cur a sole terra jampridem destructa et absorpta non sit, nec in futurum esse possit.[6] Caput huic rei distantiam ponit terræ a stellis fixis immensam, a sole ipso satis magnam, et qualis esse debeat, bene mensuratam. Secundo, declinationem radiorum solis a perpendiculo, habito respectu ad partes terræ diversas; quod videlicet supra majorem partem terræ sol nunquam sit in vertice, aut incidentia radiorum perpendicularis; adeo ut

[1] "A sole porro terram oppugnante, ejusque naturam et conditiones reliquas deturbante, suasque indente, tot interea adeoque diversa constituuntur entia: . . . Solis terræque vires longè amplissimæ sunt . . . et dum alteræ alteras oppugnant et ad internecionem agunt, nequaquam stertunt nihilque contra agunt alteræ, sed strenuè repugnant, et dum non penitus percunt contrarias et ipsæ oppugnant oblæduntque et imminuunt."—*De Rer. Nat.* i. 14.

[2] "Materiæ molem neque minui neque augeri unquam."—*Ib.* i. 5.

[3] "Communis ipsorum omnium (crasslorum entium) delapsus . . . moli assignandus est."—*Ib.* i. 4. The reason being, that it cannot be assigned to heat which tends upwards, nor to cold which tends to immobility.

[4] See above, p. 94. n. 8. [The original has *ingredine.—J. S.*]

[5] "Quam . . . molis portionem sortitus est calor penitus illam is subiit universam. . . . Calori frigorique illam ut libet effingendi disponendique, non et efficiendi et veluti novam creandi, donata est vis."—*Ib.* i. 5.

[6] The tenth chapter of Telesius's first book is teleological. "Summa Dei bonitas . . . ens nullum . . . perdi velit." For the preservation of the universe and the balance of heat and cold, the earth is put in the middle point of the heavens. The heavens and the earth are both spherical—the former according to the free and uniform motion of the different orbs, and the latter that half of it may always be exposed to the sun's influence. If the earth were larger and not in the centre of the universe, the power of cold would predominate and destroy the lower part of heaven. For the security of the earth,—the density and heat of the heavens are not uniform, and both sun and stars are at a great distance; and the oblique and unequal motion of the sun prevents his remaining too long over any part of the earth's surface. All this agrees tolerably well with Bacon's account of it, but to his fifth reason I do not find anything corresponding in the text.

universum terræ globum vigore aliquo caloris notabili nunquam occupet. Tertio, obliquitatem motus solis in transcursu per zodiacum, habito respectu ad easdem terræ partes; unde calor solis in qualicunque vigore non assiduo ingeminatur, sed per intervalla majora redit. Quarto, celeritatem solis respectu motus diurni, qui tantum ambitum tam exiguo temporis spatio conficit; unde minor mora caloris, neque momentum aliquod temporis in quo calor constet. Quinto, continuationem corporum inter solem et terram, quod sol non per vacuum integras caloris demittat vires, sed per tot corpora renitentia permeans, et cum singulis satagens et dimicans, in immensum langueat et enervetur; tanto magis quod quo longius procedat atque debilior evadat, eo corpora inveniat magis inobsequentia; maxime omnium, postquam ad terræ superficiem ventum est, ubi videtur non solum renitentia, sed plane quædam repulsio. Processum vero immutationis talem asserit. Bellum plane inexpiabile atque internecivum esse; neque contrarias istas naturas ullo symbolo convenire, neque per tertiam, præterquam hylen. Itaque utramque naturam hoc ipsum appetere, niti, contendere, ut alteram plane perdat, seque solam et suam materiæ indat; ut sit solis opus (quod perspicue et sæpe dicit) plane terram vertere in solem; et vicissim opus terræ, solem vertere in terram[1]; neque hoc officere quin omnia certo ordine, definitis temporibus, et justis mensuris fiant; atque actio quæque cursu debito incipiat, moliatur, vigeat, langueat, cesset. Quod tamen per leges fœderis aut concordiæ ullas non fieri, sed omnino per impotentiam: omne enim plus et minus in virtute et actione, non ab intensionis moderamine (quæ integrum quiddam concupiscit), sed ab oppositæ naturæ ictu et fræno esse. Operationis diversitatem et multiplicitatem atque etiam perplexitatem omnino propter unum ex tribus istis evenire; vim caloris, dispositionem materiæ, modum subactionis; quæ tamen tria nexu quodam inter se implicantur, atque sibi ipsis concausæ sunt. Calorem ipsum, vi, copia, mora, medio, successione differre: successionem vero ipsam in plurimis variari; accedentia, recedentia; sive intensione, remissione; saltu, gradu, reditu; sive repetitione per majora aut

[1] "Calorem in terram sol emittens . . . quas ejus portiones exuperat, . . . ipsum . . . in ignem, ipsum scilicet in cœlum, solemque agit in ipsum. . . . Si integrum, robustumque, et diuturnum adsit frigus, quæ corripit . . . ipsam in terram ea acturum sit omnia." — *De Rer. Nat.* i. 1.

minora intervalla; atque hujusmodi alterationibus. Calores itaque prorsus vi et natura longe diversissimos esse, prout puriores vel impuriores, habita ratione ad primum fontem (solem videlicet), facti sint. Neque calorem omnem calorem fovere; sed postquam gradibus bene multis ad invicem distent, se mutuo non minus quam frigora perimere ac perdere, et proprias actiones agere, et alterius actionibus adversari atque opponi; ut minores calores ad multo majores constituat Telesius tanquam proditores et perfugas, et cum frigore conspirantes.[1] Itaque vividum illum calorem qui in igne est et vibratur, exilem illum calorem qui in aqua serpit omnino interimere; atque similiter calorem præternaturalem humorum putridorum, in corpore humano, calorem naturalem suffocare et exstinguere. Copiam vero caloris plurimum interesse, manifestius esse quam ut explicatione egeat. Neque enim unam aut alteram ignis prunam æque vehementer ac multas coacervatas calefacere; maxime autem insigniter copiæ caloris effectum demonstrari in multiplicatione caloris solis, per reflexionem radiorum; numerus enim radiorum conduplicatur per reflexionem simplicem, multiplicatur per variam. Copiæ caloris vero debet adscribi vel addi et unio, quod etiam obliquitate et perpendiculo radiorum optime ostenditur, cum quo propius et ad acutiores angulos radius directus et reflexus coëat, eo validiorem caloris ictum jaciat. Quin et sol ipse, cum inter majores illos et robustiores stellarum fixarum ignes, Regulum, Canieulum, Spicam, versatur, valentiores fervores efflat. Moram vero caloris evidentissime maximi momenti operationem esse; eum omnes virtutes naturales tempora colant, observent; ut ad vires actuandas tempus requiratur nonnullum, ad roborandas bene multum. Itaque moram caloris calorem æqualem in progressivam et inæqualem convertere, quia calor et antecedens et subsequens simul conjugantur; id et in fervoribus autumnalibus, quia fervoribus solstitialibus, et in horis æstivis pomeridianis, quia horis ipsis meridianis ardentiores sentiuntur, manifestum esse; etiam in frigidioribus regionibus debilitatem caloris, mora et longitudine dierum æstivis temporibus quandoque compensari. At medii potentiam et efficaciam in calore

[1] "Quis enim calidorum entium longe diversissimas esse vires, et calida quæ sunt, sese mutuo aversari aufugereque, et mutuo sese oppugnare interimereque, calores scilicet diversis donatos viribus, sese mutuo oppugnare corrumpereque non percipit?" — *De Rer. Nat.* i. 13.

deferendo insignem esse. Hinc enim tempestatum temperiem magnopere variam, ut cœlum indicibili inconstantia per dies æstivos algidum nonnihil, per dies hiemales sudum quandoque inveniatur; sole interim iter suum et spatia sua constanter et legitime servante. Etiam segetes et uvas flantibus austris et cœlo nubiloso magis mutari. Atque omnem cœli secundum varias annorum revolutiones dispositionem et excretionem, aliquando pestilentem et morbidam, aliquando salubrem et amicam, hinc causam et originem sumere; medio scilicet aëre variante, quæ dispositionem ex ipsa vicissitudine et alteratione tempestatum diversam, longa fortasse serie, colligit. Successionis vero caloris atque ordinis quo calor calorem consequitur, ut multiplicem rationem, ita summam virtutem esse. Neque solem tam numerosam et prolificam generationem educere potuisse, nisi corporis solis moventis configuratio versus terram et terræ partes plurimæ inæqualitatis et variationis particeps esset. Nam et circulariter movetur sol, et rapide et ex obliquo, et se retexit, ut et absens sit et præsens, et propior et remotior, et magis ex perpendiculo et magis ex obliquo, et citius rediens et tardius, neque ullo temporis momento calor emanans a sole sibi constet, neque brevi intervallo usquam (nisi sub ipsis tropicis) se restituat; ut tanta variatio generantis cum tanta varietate generati optime conveniat. Cui addi posse medii sive vehiculi naturam diversissimam. Cætera quoque quæ de inæqualitate et gradibus caloris unici dicta sunt, posse ad vicissitudines et varietates successionis in caloribus diversis referri. Itaque Aristotelem non male generationem et corruptionem rerum obliquæ viæ solis attribuisse, eamque ut efficientem causam earum constituisse[1], si libidine pronuntiandi et arbitrum naturæ se gerendi, et res ad placitum suum distinguendi et concinnandi, recte inventum non corrupisset. Illum enim et generationem et corruptionem (quæ nunquam prorsus privativa, sed generationis alterius prægnans est) inæqualitati caloris solis secundum totum, hoc est, accedentiæ et recedentiæ solis conjunctim, non generationem accedentiæ, corruptionem recedentiæ divisim, assignare debuisse; quod pinguiter et ex vulgi fere judicio fecit.[2] Quod si cui mirum videatur, generationem

[1] "Efficientem rerum causam . . . perperam (ab Aristotele) obliquæ solis lationi assignatam. Obliqua latio non aliud agit quicquam, sed tantum ut Sol magis minusve directus fiat."—*De Rer. Nat.* iv. 2.

[2] "Solem accedentem generationis causam non esse, nec recedentem corruptionis, ut Aristoteli placet."

rerum soli attribui; cum sol ignis esse asseratur et supponatur, ignis autem nil generet; id leviter objici. Somnium enim plane esse illud de heterogenia calorum solis et ignis. Infinitas enim esse operationes, in quibus actio solis et actio ignis conveniant; ut in maturatione fructuum, conservatione plantarum tenerarum et clementiæ cœli assuetarum in regionibus frigidis, exclusione ovorum, restitutione urinarum ad claritatem (calorem enim solis et animalis conjungimus), resuscitatione animalculorum frigore obrigentium, evocatione rorum[1] et vaporum, et id genus.[2] Sed nihilominus ignem nostrum malum mimum esse, nec solis actiones bene imitari aut prope attingere; cum solis calor tribus dotatus sit proprietatibus, quas ignis communis ægre ullo artificio repræsentare possit.[3] Primo, quod sit ob distantiam gradu ipso minor et blandior; hoc vero ejusmodi esse, ut aliquo modo æquiparari possit; caloris enim talis modus magis incognitus est quam imparabilis. Secundo, quod per tot et talia media fluens et gliscens dissimularem quandam et generativam vim mutuetur et obtineat; maxime vero quod tam regulari inæqualitate augeatur, minuatur, accedat, recedat, nunquam vero subsultorie aut præcipitanter sibi succedat. Quæ duo postrema ab igne fere sunt inimitabilia, licet industria perspicaci et perpensa res provehi possit. Atque hujusmodi quædam de diversitate calorum a Telesio dicuntur.

Frigidi autem, contrarii nempe principii, atque dispensationis ejus vix meminit[4]; nisi forte quæ de dispositione materiæ jam secundo loco dicentur, ea huic rei satisfacere posse putaverit; quod tamen facere non debuit, quandoquidem frigus nullo modo privationem caloris, sed omnino principium activum, caloris æmulum et tanquam competitorem, videri voluit. Quæ autem de materiæ dispositione disseruit, eo pertinent ut ostendant quomodo materia a calore patiatur et subigatur et vertatur, missa frigoris mentione aut cura. De frigore autem (nos enim in omnium inventis summa cum fide, et tanquam

[1] *eorum* in the original. — *J. S.*

[2] "Igneum calorem ab animalium solisque calore diversum non esse." — *De Rer. Nat.* vi. 20. Telesius gives some instances in proof of this assertion: Bacon's however are for the most part his own.

[3] "Non igitur ad animalium plantarumque generationem ineptus est ignis, quod ejus calor ab animalium et a cœlesti calore diversus sit, sed quod nimis est vehemens." — *Ib.* vi. 20.

[4] "Nostrorum entium nullum prorsus a frigore, sed eorum quodvis a calore constitutum est, et vel suprema terræ portio in calidum acta est ens." — *Ib.* i. 16.; a passage which suggests the remark I have already made, that Telesius did not regard heat and cold as equally active principles. Compare ii. 23. throughout.

faventes, versamur) hujusmodi quædam dicere potuit. Sedem frigidi immotam et fixam ad structuram caloris mobilem et versatilem optime convenire; tanquam incudem ad malleum. Nam si utrumque principium varietatem et alterationem habuisset, genuissent proculdubio entia horaria et momentanea. Etiam immensas regiones calidi (cœlum scilicet), compacta natura globi terræ et circumjacentium nonnihil compensari; cum non spatia, sed copia materiæ in spatiis spectetur; frigidi vero naturam, virtutes, et rationes, merito aut silentio præteriri aut brevi sermone transmitti debere, cum nil certi et explorati de eo haberi possit per experientiam. Habemus enim ignem communem, tanquam solis vicarium, qui caloris naturam manifestet. At frigidi telluris nulla est substitutio, quæ in manu hominis sit et adhibeatur præsto ad experimentum. Etenim illos horrores et rigores frigidi qui ex globo et ambitu terræ hiemalibus temporibus et in regionibus frigidissimis exspirant in aërem, tepores plane et balnea esse, præ natura primi frigidi in visceribus terræ inclusi; ut frigus illud cujus homines sensum et potestatem habeant, simile quiddam sit, ac si calorem nullum alium haberent, præter eum qui a sole æstivis diebus et in calidis regionibus emanat; qui ad ignes fornacis ardentis collatus, refrigerium quoddam censeri possit. Sed in iis quæ subdititia sunt minus morandum. Videndum igitur deinceps, qualia sint ea quæ a Telesio dicuntur circa dispositionem materiæ, in quam calor agat; cujus ea est vis, ut actionem ipsam caloris promoveat, impediat, immutet. Ejus ratio quadruplex. Prima differentia sumitur ex calore præinexistente aut non præinexistente.[1] Secunda, ex copia aut paucitate materiæ.[2] Tertia, ex gradibus subactionis.[3] Quarta, ex clausura vel apertura corporis subacti.[4] Quod ad primam attinet, supponit Telesius in omnibus entibus quæ nobis cognita sunt subesse atque latitare calorem nonnullum, licet ad tactum minime deprehendatur, qui calor cum novo aut supervenicnte calore conjungitur; quin et ipse ab eodem adventitio calore ad actiones suas peragendas etiam in proprio modulo excitatur atque incenditur. Hujus rei argumentum esse insigne, quod nullum scilicet sit ex entibus, non metallum,

[1] See above [p. 98. note 3.].

[2] "Materiæ dispositiones . . . juxta expansionis constrictionisque diversitatem expendendas esse."— *De Rer. Nat.* i. 19.

[3] Ib. i. 20. passim.

[4] This difference is not stated by Telesius, though it may be presumed that it had occurred to him.

non lapis, non aqua, non aër, quod non ex attactu atque etiam ab admotione ignis aut corporis calidi calescat.[1] Quod factum iri verisimile non est, nisi calor præinexistens et latens præparatio quædam esset ad calorem novum et manifestum. Etiam illud magis et minus, nempe facilitatem aut tarditatem in calore concipiendo, quod in entibus invenitur, secundum modum caloris præinexistentis competere. Aërem enim parvo calore tepescere, atque eo qui in corpore aquæ non percipiatur sed sensum fugiat. Etiam aquam citius tepescere, quam lapidem aut metallum aut vitrum. Nam quod aliquod ex istis, metallum scilicet aut lapis, citius tepescere videatur quam aqua, id tantum in superficie fieri, non in profundo; quia corpora consistentia minus communicabilia sunt in partibus suis, quam liquida. Itaque extima metalli citius calefieri quam extima aquæ, universam autem molem tardius. Secunda differentia ponitur in coacervatione et exporrectione materiæ. Ea si densa fuerit, fit ut caloris vires magis uniantur, et per unionem magis augeantur et intendantur; contra, si laxior fuerit, ut magis disgregentur, et per disgregationem magis minuantur et enerventur. Itaque fortiorem esse calorem metallorum ignitorum quam aquæ ferventis, etiam quam flammæ ipsius, nisi quod flamma per tenuitatem magis subintret. Nam flammam carbonum sive lignorum, nisi flatu excitetur, ut per motum facilius impellatur et penetret, non admodum furere; quin et nonnullas flammas (qualis est spiritus vini inflammati, præsertim in exigua quantitate et dispersa) adeo lenis caloris esse, ut ad manum fere toleretur. Tertia differentia, quæ sumitur ex subactione materiæ, multiplex est; gradus enim subactionis memorantur ab eo quasi septem[2]; quorum primus est Lentor,

[1] The notion of heat latent in all bodies, inexistens calor, is frequent in Telesius; as in the passage quoted above, p. 98., from the thirteenth chapter of the first book, and as in the nineteenth, where it is said, "Comprimendi (calori) nimirum ut cedant flectanturque et fluant . . . . . inexistens præstat calor qui, si non proprîâ vi, at comprimentis ope usus, illam commovet;" where illam, I believe, refers to the words "materiæ expansio," contained in the clause I have omitted. But I have not found the argument by which Bacon goes on to support this doctrine, which would naturally have occurred in the twenty-third chapter of the second book, in which Telesius seeks to show that all the elements except earth bear traces of having been generated by heat.

[2] Only six. "Insignes crassitiei ad tenuitatem progredientes immutationes, lentorem, molliticm, viscositatem, fluorem, vaporem esse." After describing these five degrees, Telesius goes on at once to say: "Sextum verum atque extremum (spatium occupat) tenuitas, quæ scilicet non tactum modo sed quantumvis in se ipsa coacta visum etiam, quod vapores non faciunt, penitus lateat et quantavis facta lucem nihil imminuit fœdatve usquam, ut a vaporibus sejungenda ideo sit et cœlo ex universo inesse videtur."— *De Rer. Nat.* i. 20. Whence it seems that air is included among the vapores.

qui est dispositio materiæ exhibens corpus ad majorem violentiam nonnihil obsequens, et compressionis et præcipue extensionis patiens, flexibile [1] denique aut ductile. Secundus, Mollities, cum majore violentia nil opus est, sed corpus etiam levi impulsione atque ad tactum ipsum sive manum cedit, absque evidenti renitentia. Tertia, Viscositas sive Tenacitas, quæ est principium quoddam fluoris. Videtur enim corpus viscosum ad contactum et complexum alterius corporis incipere fluere et continuari, nec se ipso finiri, licet sponte et ex sese non fluat; fluidum enim sui sequax est, viscosum alterius magis. Quarta, ipse fluor, cum corpus spiritus interioris particeps in motu versatur libens, et seipsum sequitur, atque ægre definitur aut consistit. Quinta, Vapor, cum corpus attenuatur in intactile, quod etiam majore cum agilitate et mobilitate cedit, fluit, undulat, trepidat. Sexta, Halitus, qui vapor est quidam magis coctus et maturus, et ad igneam naturam recipiendam subactus. Septima, aër ipse; aërem autem contendit Telesius omnino calore nativo, neque eo parvo aut impotenti, præditum esse; quod etiam in frigidissimis regionibus aër nunquam congelatur aut concrescit. Etiam illud evidenti indicio esse, aërem in natura propria calidum esse, quod omnis aër clausus, et ab universitate aëris divulsus, et sibi permissus, teporem manifeste colligit; ut in lana et rebus fibrosis. Etiam in locis clausis et angustis, aërem ad respirationem sentiri quodam modo suffocativum, quod a calido est. Atque hæc propterea fieri, quod aër clausus sua natura uti incipiat, cum aër foras et sub dio refrigerctur a frigore, quod globus terræ perpetuo emittit et efflat. Quin etiam aërem nostrum communem tenui quadam cœlestium dote insigniri, cum habeat nonnihil in se lucis; quod ex visu animalium, quæ noctu et in locis obscuris cernere possunt, ostenditur.[2] Atque talis est Telesio dispositionis materiæ series, in mediis videlicet; siquidem extrema, videlicet ex altera parte corpora dura et rigida, ex altera ignis ipse, tanquam termini mediorum non recen-

[1] *fluxibile* in the original. — *J. S.*

[2] That certain animals can see at night is with Telesius a proof that the apparently obscure parts of the heavens — the highest and lowest, — give out a perceptible amount of light, not that the air is itself luminous, — unless the "infima cœli portio" be understood to mean our atmosphere. (See De Rer. Nat. i. 3.) It is remarkable that Bacon omits Telesius's chief argument in favour of the opinion that the air is generated by and contains heat, namely that it partakes in some measure of the circular motion which the heavens derive from the pure and effectual heat by which they are constituted. The natural motion of the air is made manifest according to Telesius by the sound heard when a shell is put to the ear.

sentur. Sed præter hosce gradus simplices, magnam aucupatur diversitatem in dispositione materiæ ex corpore similari et dissimilari; cum scilicet portiones materiæ in uno corpore compositæ et coadunatæ, vel ad unum ex gradibus supra-dictis æqualiter referri possunt, vel ad diversa impariter.[1] Longe enim maximam inde sequi in operatione caloris differentiam. Itaque quartam illam differentiam necessario adhiberi ex natura ac etiam positura corporis in quod calor agat, clausa, aut porosa et aperta. Quando enim in aperta et exposita operatur calor, operatur seriatim et per singula, attenuando et simul educendo et separando. Cum vero in occlusa et compacta, operatur secundum totum et secundum massam, nulla facta jactura caloris, sed calore novo et vetere se conjungentibus et plane conspirantibus; unde fit ut potentiores et magis intrinsecas et exquisitas alterationes et subactiones conficiat. Verum de hoc plura mox dicentur, cum de modo subactionis disseremus. Sed interim satagit et æstuat Telesius, et miris modis implicatur[2], ut expediat modum divortii et separationis qualitatum suarum primarum connaturalium, caloris, lucis, tenuitatis, et mobilitatis, ac quaternionis oppositæ, prout corporibus accidunt: cum corpora alia inveniantur calida, aut ad calorem optime præparata, sed eadem inveniantur quoque densa, quieta, nigra; alia tenuia, mobilia, lucida sive alba, sed tamen frigida; et similiter de cæteris; una quapiam qualitate in rebus existente, reliquis non competentibus; alia vero duabus ex istis naturis participent, duabus contra priventur, varia admodum permutatione et consortio. Qua in parte Telesius non admodum feliciter perfungitur, sed more adversariorum suorum se gerit; qui cum prius opinantur quam experiuntur, ubi ad res particulares ventum est, ingenio et rebus abutuntur, atque tam ingenium quam res misere lacerant et torquent; et tamen alacres et (si ipsis credas) victores suo sensu utcunque abundant. Concludit autem rem per desperationem et votum, illud significans, licet et caloris vis et copia, et materiæ dispositio, crasso modo et secundum summas distingui et terminari possint; tamen exactas et accuratas eorum rationes, et distinctos et tanquam mensuratos modos, extra inquisitionis humanæ

[1] "Perpauca quædam similari e terrâ et uno eodemque a calore universa effecta sunt . . . sed e terrâ pleraque, quæ aliis sui partibus et non magnis iis tenuis laxiorque, aliis vero crassior est densiorque."—*De Rer. Nat.* i. 15.

[2] See De Rer. Nat. i. 16. The general purport of his explanation is, that the action of heat is mingled with and controlled by that of cold.

aditus sepositos esse; ita tamen, ut (quo modo inter impossibilia) diversitas dispositionis materiæ, melius quam caloris vires et gradus, perspici possit; atque nihilominus in his ipsis (si qua fata sinant) humanæ et scientiæ et potentiæ fastigium et culmen esse. Postquam autem desperationem plane professus esset, tamen in vota precesque non cessat. Ita enim dixit: *Qui porro calor vel quantus, hoc est, quod caloris robur et quæ ejus copia, quam terram et quæ entia in qualia invertat, minime inquirendum videtur, ut quod homini nulla (ut nobis videtur) innotescere queat ratione. Quî enim vel caloris vires et calorem ipsum veluti in gradus partiri, vel materiæ cui inditus est copiam quantitatemque distincte percipere et certis determinatisque caloris viribus copiæque certam materiæ quantitatem dispositionemque certasque actiones, aut contra*[1], *certæ materiæ quantitati certisque actionibus certam determinatamque caloris copiam, assignare liceat? Utinam id otio fruentes et perspicaciore prædíti ingenio, et quibus in summa tranquillitate rerum naturam perscrutari licuerit, assequantur: ut homines non omnium modo scientes, sed omnium fere potentes fiant!*[2] honestius paulo quam solent ejus adversarii, qui quicquid artes quas ipsi pepererunt non assequuntur, id ex arte omnino impossibile statuunt, ut nulla ars damnari possit, cum ipsa et agat et judicet. Restat tertium quod erat, subactionis videlicet modus. Hoc triplici dogmate absolvit Telesius. Primum est, id quod antea a nobis obiter est notatum, nullam prorsus symbolizationem intelligi (ut in Peripateticorum doctrina), per quam res tanquam concordia quadam foveantur et conspirent. Omnem enim generationem, atque adeo omnem effectum in corpore naturali, victoria et prædominantia, non pacto aut fœdere transigi. Id quod novum non est, cum etiam Aristoteles in doctrina Empedoclis hoc ipsum notaverit.[3] Quod scilicet cum Empedocles Litem

[1] *centra* in original.

[2] This quotation is inaccurate. "Qui porro calor, vel quantus, quod nimirum caloris robur et quæ ejus copia, quam terram et quæ entia in qualia invertat, minime inquirendum videtur, ut quod homini nulla, ut nobis videtur, innotescere queat ratione. Qui enim vel caloris vires, et calorem ipsum veluti in gradus partiri vel materiæ cui inditus est copiam quantitatemque distinctè percipere, et certis determinatisque caloris viribus copiæque in certam materiæ quantitatem dispositionemque, certas actiones et certæ materiæ quantitati certam determinatamque caloris copiam assignare liceat? Utinam id alii et perspicaciore prædíti ingenio et quibus in summâ tranquillitate rerum naturam perscrutari licuerit assequantur, ut homines non omnium modo scientes sed et potentes fiant."—*De Rer. Nat.* i. 17. Perhaps Bacon may quote from the edition published in 1565 [or from a copy corrected by conjecture; for there is evidently something wrong in the passage as it stands. — *J. S.*]

[3] Arist. Meteor. iii. 4.

et Amicitiam, rerum principia efficientia statuisset, tamen in explicationibus suis causarum, Inimicitia fere utatur, alterius tanquam oblitus. Secundum est, calorem actione sua propria perpetuo vertere ens in humidum, et quod calori siccitas nullo modo coëat, nec frigori humiditas.[1] Idem enim esse attenuare et humectare; atque quod maxime tenue, id etiam maxime humidum esse: eum per humidum intelligatur id quod facillime cedit, abit in partes, et rursus se restituit, atque ægre finitur aut consistit. Quæ omnia magis insunt flammæ, quam aëri; qui a Peripateticis constituitur maxime humidus. Itaque calorem, humidum perpetuo allicere, depascere, extendere, indere, generare; contra, frigus omnia agere in siccitatem, concretionem, duritiem; ubi vult Aristotelem et hebetem in observatione, et sibi discordem, et erga experientiam imperiosum et libidinosum videri, quod calorem cum siccitate copulet.[2] Nam quod aliquando entia desiceet calor, id per accidens fieri; nimirum in corpore dissimilari et ex partibus aliis magis crassis aliis magis tenuibus coagmentato, eliciendo et (per attenuationem) exitum dando parti tenuiori, dum pars crassior inde cogatur et magis se constringat: quæ tamen ipsa pars crassior, si advenerit calor ferocior, et ipsa fluit; ut in lateribus manifestum est. Primo enim calor non ita fervens[3], lutum cogit in lateres, tenuiore parte evaporata; at fortior calor etiam illam substantiam lateritiam solvit in vitrum. Atque hæc duo dogmata veluti errorum redargutiones censeri possunt; tertium plane affirmat, neque id solum, sed et perspicue distinguit subactionis modum. Is duplex est, vel rejiciendo, vel vertendo; atque alteruter ex iis modis perducitur in actum, secundum vim caloris et dispositionem materiæ. Cujus rei tamen duo videntur tanquam canones. Unus, quod cum calidum et frigidum magna mole et tanquam justo exercitu concurrunt, sequitur ejectio. Nam entia, veluti acies, loco moventur et impelluntur. Ubi vero minore quantitate res geritur, tum sequitur versio[4]; nam interimuntur entia et naturam potius quam locum mutant. Hujus rei insigne et nobile exemplum esse in regionibus aëris superioribus, quæ licet ad calorem cœlestem magis appropinquent, tamen frigidiores inveniuntur quam con-

[1] "Propria igitur caloris, et caloris opus humiditas."—*De Rer. Nat.* iii. 14.

[2] "Naturæ itidem sensuique et sibi etiam ipsi discors Aristoteles calori siccitatem et frigori humorem copulat."—*Ib.* l. c.

[3] *servans* in the original.—*J. S.*

[4] It does not appear that Telesius recognised the possibility of transforming heat into cold, or vice versâ; which seems to be implied by the word versio.

finia terræ. In illis enim locis, postquam propius ad sedem primi calidi ventum est, calor se colligens universam frigoris vim quæ adscenderat simul ejicit et detrudit, et aditu prohibet. Quinetiam similiter fieri posse, ut sint per profunda terræ calores vehementiores quam in superficie; postquam scilicet ad sedem primi frigidi appropinquatio facta est, quod se excitans, magno impetu calidum rejicit, et fugit[1], et in se vertit. Alter canon est, quod in aperto sequitur ejectio; in clauso versio. Hoc autem insigniter conspici in vasibus occlusis, ubi emissio corporis attenuati (quod spiritum fere vocamus) prohibita et retrusa profundas et intrinsecas in corporibus alterationes et fermentationes generat. At hoc ipsum similiter fieri, cum corpus ob partium compactionem sibi ipsi instar vasis occlusi est. Atque hæc sunt quæ Telesio, et fortasse Parmenidi, circa rerum principia visa sunt; nisi quod Telesius hylen addidit de proprio; peripateticis scilicet notionibus depravatus.

Atque similia veri fuissent quæ a Telesio dicuntur, si homo tollatur e natura, et simul artes mechanicæ quæ materiam vexant, atque fabrica mundi simpliciter spectetur. Nam pastoralis quædam videtur ista philosophia, quæ mundum contemplatur placide, et tanquam per otium. Siquidem de systemate mundi disserit non male, de principiis imperitissime. Quin et in ipso quoque systemate ingens est lapsus, quod tale constituat systema quod videri possit æternum, nec supponat chaos et mutationes schematismi magni. Sive enim ea est Telesii philosophia, sive Peripateticorum, sive quæ alia, quæ in eum modum systema instruat, libret, muniat, ut non videatur fluxisse a chao; ea levior philosophia videtur, atque omnino ex angustiis pectoris humani. Nam omnino secundum sensum philosophanti materiæ æternitas asseritur; mundi (qualem eum intuemur) negatur; quod et priscæ sapientiæ, et ei qui ad ipsam proxime accedit, Democrito, visum est. Idem sacræ literæ testantur. Illud præcipue interest; quod illæ etiam materiam a Deo; hi ex sese statuunt. Tria enim videntur esse dogmata quæ scimus ex fide circa hanc rem. Primo, quod materia creata sit ex nihilo. Secundo, quod eductio systematis fuerit per verbum omnipotentiæ, neque quod materia se ipsa eduxerit e chao in schematismum illum. Tertio, quod schematismus ille (ante prævaricationem) fuerit optimus ex iis quæ materia (qualis creata erat) suscipere posset. At philosophiæ illæ ad nullum horum adscen-

[1] So in the original — *J. S.*

dere potuerunt. Nam et creationem ex nihilo exhorrent, et hunc schematismum post multas ambages et molimina materiæ eductum sentiunt; nec de optimitate laborant, cum schematismus asseratur occiduus et variabilis. In his itaque fidei atque ejus firmamentis standum. Utrum vero materia illa creata, per longos seculorum circuitus, ex vi primo indita se in illum optimum schematismum colligere et vertere potuisset (quod missis ambagibus ex verbi imperio continuo fecit), non inquirendum fortasse est. Tam enim est miraculum, et ejusdem omnipotentiæ, repræsentatio temporis quam efformatio entis. Videtur autem natura divina utraque omnipotentiæ emanatione se insignire voluisse: primo, operando omnipotenter super ens et materiam, creando scilicet ens e nihilo; secundo, super motum et tempus, anticipando ordinem naturæ, et accelerando processum entis. Verum hæc ad parabolam de Cœlo pertinent, ubi quæ nunc breviter perstringimus fusius disseremus. Itaque ad principia Telesii pergendum. Atque utinam hoc saltem semel et inter omnes conveniret, ne aut ex non entibus entia, aut ex non principiis principia, constitui placeret, neque manifesta recipiatur contradictio. Principium autem abstractum non est ens; rursus ens mortale non est principium; ut necessitas plane invincibilis hominum cogitationes (si sibi constare velint) compellat ad atomum, quod est verum ens, materiatum, formatum, dimensum, locatum, habens antitypiam, appetitum, motum, emanationem. Idem per omnium corporum naturalium interitus manet inconcussum et æternum. Nam cum tot et tam variæ sint corporum majorum corruptiones, omnino necesse est ut quod tanquam centrum manet immutabile id aut potentiale quiddam sit, aut minimum. At potentiale non est; nam potentiale primum, reliquorum quæ sunt potentialia simile esse non potest, quæ aliud actu sunt, aliud potentia. Sed necesse est ut plane abstractum sit, cum omnem actum abneget, et omnem potentiam contineat. Itaque relinquitur, ut illud immutabile sit minimum; nisi forte quis asserat omnino principia nulla existere, sed rem alteram alteri pro principiis esse, legem atque ordinem mutationis constantia esse et æterna, essentiam ipsam fluxam et mutabilem. Atque satius foret hujusmodi quiddam diserte affirmare, quam studio æternum aliquod principium statuendi, in durius incommodum incidere, ut idem principium ponatur phantasticum. Illa enim prior ratio aliquem exitum habere videtur, ut res mutentur in

orbem; hæc prorsus nullum, quæ notionalia et mentis adminicula habet pro entibus. Et tamen quod hoc ipsum nullo modo fieri possit, postea docebimus. Telesio tamen *hyle* placuit, quam ex juniore ævo postnatam in Parmenidis philosophiam transtulit. At certamen instituit Telesius agentium suorum principiorum mirum et plane iniquum, et copiis et genere bellandi. Nam quod ad copias attinet, terra ei est unica, at cœli exercitus ingens; etiam terra puncti fere instar, cœli vero spatia et regiones immensæ. Neque huic incommodo illud subvenire queat, quod terra et connaturalia ejus ex materia maxime compacta asserantur, cœlum contra et ætherea ex materia maxime explicata. Licet enim plurimum certe intersit, tamen hæc res nullo modo copias vel longo intervallo æquabit. At robur dogmatis Telesii versatur in hoc vel præcipue, si tanquam æqualis portio hyles (secundum quantum, non secundum exporrectionem) utrique principio agenti assignetur, ut res durare possint, et systema constitui et stabiliri. Quicunque enim cum Telesio sentiet in cæteris, et exsuperantiam hyles, præsertim tam amplo excessu, in uno principio, ad alterum recipiet, hærebit nec se omnino explicabit. Itaque in dialogo Plutarchi de facie in orbe lunæ, sana mente proponitur illa consideratio, non esse verisimile, in dispersione materiæ naturam quicquid compacti corporis erat in unicum terræ globum conclusisse, tot interim volventibus globis astrorum. Huic vero cogitationi tam immoderate indulsit Gilbertus, ut non solum terram et lunam, sed complures alios globos solidos et opacos per expansionem cœli inter globos lucentes sparsos assereret.[1] Quin et ipsi Peripatetici, postquam cœlestia suo statu, sublunaria autem per successionem et renovationem æterna posuissent, non confisi sunt se hoc dogma tueri posse, nisi elementis veluti æquas materiæ portiones assignassent. Hoc est enim illud, quod de decupla illa portione qua ambiens elementum interius elementum superet consomniant. Neque ista eo adducimus, quod nullum ex iis nobis placeat, sed ut ostendamus inopinabile quiddam esse, atque cogitationem prorsus male mensuratam, si quis terram contrarium agens cœlo principium statuat: quod Telesius fecit. Atque hoc ipsum durius multo invenitur, si quis præter quantum ipsum, disparem virtutem et actum cœli et terræ intueatur. Perdita enim omnino sit dimicationis conditio, si ex altera parte telorum

[1] Gilbert, Nov. Phys. i. 10.

hostilium ictus perferantur, ex altera non pertingant, sed citra cadant. At liquet plane solis vires in terram mitti; terræ autem vires usque ad solem pervenire nemo spondeat. Etenim inter omnes virtutes quas natura parit, illa lucis et umbræ longissime emittitur, et maximo spatio sive orbe circumfunditur. Umbra autem terræ citra solem terminatur, cum lux solis, si terra diaphana esset, globum terræ transverberare possit. Nominatum calidum, frigidum, (de quibus nunc est sermo) nunquam deprehenduntur tam magna spatia vincere in virtute sua perferenda, quam lux et umbra. Itaque si umbra terræ non pertingit ad solem, multo minus frigidum terræ eo adspirare posse consentaneum est. Id si ita sit, nempe ut sol et calidum in quædam corpora media agant, quo contrarii principii virtus non adscendat, nec ullo modo eorum actum impediat; necesse est ut illa (sol, inquam, et calidum) proxima quæque occupent, et dein remotiora quoque conjungant, ut tandem futura sit Heracliti conflagratio, solari et cœlesti natura gradatim versus terram et confinia ejus descendente et magis appropinquante. Neque illa admodum conveniunt, ut vis illa naturam suam imponendi et multiplicandi et alia in se vertendi, quam Telesius principiis attribuit, non operetur in similia æque aut magis quam in contraria; ut cœlum jam excandescere debuerit, et stellæ inter se committi. Verum ut propius accedamus, quatuor omnino demonstrationes proponendæ videntur, quæ Telesii philosophiam de principiis plane convellere et destruere possint, etiam singulæ, multo magis conjunctæ. Harum prima est, quod inveniantur in rebus nonnullæ actiones et effectus, etiam ex potentissimis et latissime diffusis, quæ ad calorem et frigus nullo modo referri possint. Proxima, quod inveniantur naturæ nonnullæ quarum calor et frigus sint effectus et consecutiones; neque id ipsum per excitationem caloris præinexistentis, aut admotionem caloris advenientis; sed prorsus per quæ calor et frigus in primo esse ipsorum indantur et generentur. Itaque principii ratio in iis ex utraque parte deficit, tum quia aliquid non ex ipsis, tum quia ipsa ex aliquo. Tertia, quod etiam ea quæ a calore et frigore originem ducunt (quæ certe sunt quam plurima) tamen procedunt ab illis tanquam ab efficiente et organo, non tanquam a causa propria et intima. Postremo, quod conjugatio illa quatuor connaturalium omnino permiscetur et confunditur. Quare de his sigillatim dicemus. Atque alicui fortasse vix operæ pretium videri

possit, nos in philosophia Telesii arguenda tam diligenter versari, philosophia scilicet non admodum celebri aut recepta. Verum nos hujusmodi fastidia nil moramur. De Telesio autem bene sentimus, atque eum ut amantem veritatis et scientiis utilem et nonnullorum placitorum emendatorem et novorum hominum primum agnoscimus. Neque tamen nobis cum eo res est tanquam Telesio, sed tanquam instauratore philosophiæ Parmenidis, cui multa debetur reverentia. Sed illud in primis in causa est quod hæc fusius agamus, quod in eo qui primus nobis occurrit complura disserimus, quæ ad sequentium sectarum (de quibus postmodum tractandum erit) redargutionem transferri possint, ne sæpius eadem dicere sit necesse. Sunt enim errorum (licet diversorum) fibræ miris modis inter se implicatæ et intextæ, quæ tamen sæpenumero una redargutione, tanquam falce, demeti et succidi possint. Verum, ut occœpimus dicere, videndum quales inveniantur in rebus virtutes et actiones, quæ ad calidum et frigidum nullo rerum consensu aut ingenii violentia trahi possint. Primo itaque sumendum quod a Telesio datur, materiæ summam æternum constare, nec augeri aut minui. Hanc ille dotem, qua materia se servat et sustinet, transmittit ut passivam, et tanquam ad rationem quanti potius quam ad formam et actionem pertinentem, ac si nihil opus esset eam calori et frigori deputare, quæ agentium tantum formarum et virtutum fontes ponuntur; materiam enim non simpliciter, sed omni agente virtute destitui et exui. Atque hæc asseruntur magno mentis errore, et prorsus mirabili, nisi quod consensus atque opinio pervulgata et inveterata miraculum tollit. Nil enim simile fere inter errores reperitur, quam ut quis virtutem istam materiæ inditam (per quam ipsa se ab interitu vindicat, adeo ut minima quæque materiæ portio nec universa mundi mole obrui nec omnium agentium vi et impetu destrui aut ullo modo annihilari et in ordinem redigi queat, quin et spatii nonnihil occupet, et renitentiam servet cum dimensione impenetrabili, et ipsa vicissim aliquid moliatur, nec se deserat) pro agente virtute non habeat; cum contra sit omnium virtutum longe potentissima, et plane insuperabilis, et veluti merum fatum et necessitas. Hanc autem virtutem nec conatur Telesius ad calidum et frigidum referre. Atque hoc recte; neque enim scilicet aut incendium aut torpor et congelatio huic rei aliquid addunt vel detrahunt, nec super eum aliquid possunt; cum ipsa interim et in sole, et ad centrum

terræ, et ubique vigeat. Sed in eo lapsus videtur, quod molem materiæ certam et definitam agnoscit; ad virtutem qua se numeris suis tueatur cæcutit, eamque (profundissimis Peripateticorum tenebris immersus) accessorii loco ducit; cum sit maxime principalis, corpus suum[1] vibrans, aliud submovens, solida et adamantina in seipso, atque unde decreta et possibilis et impossibilis emanant authoritate inviolabili. Schola itidem vulgaris eam facili verborum complexu pueriliter prensat, satisfactum huic cogitationi putans, si duo corpora in eodem loco non posse esse pro canone ponat, virtutem autem istam atque ejus modum nunquam apertis oculis contemplatur et ad vivum dissecat; parum scilicet gnara, quanta ex ea pendeant, et qualis lux inde scientiis exoriatur. Verum (quod nunc agitur) ista virtus quantacunque extra Telesii principia cadit. Transeun dum jam ad virtutem illam quæ ad priorem hanc est tanquam antistropha, eam scilicet quæ nexum materiæ tuetur. Ut enim materia materia obrui non vult, ita nec materia a materia divelli. Atque nihilominus utrum hæc naturæ lex sit æque ac illa altera peremptoria, magnam habet dubitationem. Telesio enim, quemadmodum et Democrito, vacuum coacervatum et sine meta dari placuit, ut entia singularia contiguum suum deponant, nonnunquam et deserant, ægre (ut aiunt) et illibenter, sed majore nempe aliqua violentia domita et coacta; idque ille nonnullis experimentis demonstrare contendit, ea potissimum adducens, quæ passim citantur ad abnegandum et refellendum vacuum, eaque tanquam extrahens et amplians eo modo, ut entia videri possint in levi aliqua necessitate posita contiguum illud tenere; sin majorem in modum torqueantur, vacuum admittere; sicuti in clepsydris aqueis, in quibus si foramen per quod aqua descendere possit minutius sit, spiraculo egebunt, ut aqua descendat; sin latius, etiam absque spiraculo, aqua in foramen majore mole incumbens, et vacuum supra nil morata, deorsum fertur. Similiter in follibus, in quibus si eos[2] comprimas et occludas ut nullus illabenti aëri aditus pateat ac postea eleves et expandas, si pellis gracilis sit et debilis, dirumpitur pellis; si crassa et frangi inepta, non item; et alia hujusmodi.[3] Verum experimenta ista nec exacte probata sunt, nec inquisitioni omnino satisfaciunt aut quæstionem terminant; atque licet per

[1] [So in the original.] The sense appears to require *unum*.
[2] *ea* in the original. — *J. S.*
[3] De Rer. Nat. l. 25.

illa Telesius se adderc rebus et inventis putet et quod ab aliis confusius observatum est subtilius distinguere nitatur, tamen nullo modo par rebus evadit nec exitum rei evolvit, sed in mediis prorsus deficit; quod ex more est et ipsi et Peripateticis, qui ad experimenta contuenda instar noctuarum sunt, nequc id tam ob facultatis imbecillitatem, sed ob cataractas opinionum, et contemplationis plenæ et fixæ impatientiam. Quæstio vero ista (ex maxime arduis) quousque detur vacuum, et ad quæ spatia fieri possit seminum vel coitio vel distractio, et quid sit in hoc genere peremptòrium et invariabile, ad locum ubi de vacuo tractandum erit rejicinms. Neque enim multum interest ad id quod nunc agitur, utrum natura vacuum penitus respuat, an entia (ut emendatius se loqui putat Telesius [1]) mutuo contactu gaudeant. Illud enim planum facimus, istam sive vacui fugam, sive contactus cupidinem, nullo modo a calido et frigido pendere, nec a Telesio ipsi [2] adscribi, nec ex rerum ulla evidentia illis adscribi posse; cum materia loco mota aliam prorsus materiam trahat, sive illa sit calida sive frigida, sive liquida sive sicca, sive dura sive mollis, sive amica sive inimica, adeo ut corpus calidum corpus gelidissimum citius attraxerit ut ei adsit, quam se ab omni corpore disjungi et deseri patiatur. Nam vinculum materiæ fortius est quam dissidium calidi et frigidi. Et sequacitas materiæ non curat diversitatem formarum specialium. Itaque nullo modo hæc virtus nexus ab illis principiis calidi et frigidi. Sequuntur virtutes duæ invicem oppositæ, quæ regnum hoc principiorum (ut videri possit) ad calidum et frigidum detulerunt, sed jure male enucleato; eas dicimus, per quas entia se aperiunt et rarefaciunt, dilatant et expandunt, ita ut majus spatium occupent et se in majorem sphæram conjiciant; aut rursus se claudunt et condensant, coarctant et contrahunt, ita ut spatiis decedant et in minorem sphæram se recipiant. Ostendendum itaque est, quatenus ista virtus a calido et frigido ortum habeat, et quatenus seorsum moretur, nec cum illa rationes misceat. Atque verissimum est, quod affirmat Telesius, rarum et densum caloris et frigoris esse veluti opificia propria; longe enim maximæ sunt illorum partes ad hoc, ut corpora majus et minus spatium occupent; sed tamen confusius ista accipiuntur.

[1] "Entia prorsus omnia mutuum contactum sentire et summopere eo oblectari... apparent."—*De Rer. Nat.* i. 6.

[2] So in the original. I think it should be *ipso*. — *J. S.*

Videntur enim corpora quandoque ab una spatiatione naturali in alteram migrare et se transferre, idque libenter et tanquam volentia, et formam mutantia; quandoque autem tantummodo a naturali spatiatione depulsa, et manente forma veteri in consuetam spatiationem reverti. Atque virtus illa progressiva in novum spatium a calido et frigido fere regitur. At virtus altera restitutiva non item, siquidem expandit se aqua in vaporem et aërem, oleum similiter et pinguia in halitum et flammam, ex vi caloris; nec (si perfecte transmigraverint) reverti satagunt; quin et aër ipse ex calore intumescit et extenditur. Quod si migratio fuerit semiplena, post caloris abscessum in se facile recidit; ut etiam in virtute restitutiva partes frigoris et caloris sint nonnullæ. At quæ non mediante calore sed violentia aliqua extensa sunt et distracta, etiam absque ulla frigoris accessione aut diminutione caloris in priora spatia (cessante violentia) cupidissime revertuntur; ut in exsuctione ovi vitrei, et follibus levatis. Id vero in solidis et crassis longe evidentius est. Nam si distendatur pannus vel chorda, remota vi magna velocitate resiliunt; atque eadem est compressionis ratio. Nam aër violentia aliqua contrusus et incarceratus multo conatu erumpit; atque adeo omnis ille motus mechanicus quo durum a duro percutitur, qui vulgo motus violenti nomine appellatur, per quem res solidæ mittuntur et volant per aërem et aquam, nihil aliud est quam nixus partium corporis emissi ad se expediendum a compressione; et tamen nusquam hic apparent vestigia calidi et frigidi. Neque est quod quis argutetur ex doctrina Telesii hoc modo, ut dicat; Esse singulis spatiationibus naturalibus assignatam portionem quandam calidi et frigidi, ex certa quadam analogia: Itaque fieri posse ut tametsi nihil addatur caloris et frigoris, tamen si spatia materiati extendantur aut contrahantur, res eodem recidat[1], quia plus et minus imponitur materiæ in spatio, quam pro ratione caloris et frigoris. Verum ista licet non absurda dictu, tamen sunt eorum qui semper aliquid comminisci solent ut quod semel visum est teneant, nec naturam et res persequuntur. Nam si addatur calor et frigus hujusmodi corporibus extensis aut compressis, idque majore mensura quam pro ratione et natura corporis ipsius, veluti si pannus ille tensus calefiat ad ignem, tamen nullo modo rem compensabit, nec

[1] *Recidit* in original. — *J. S.*

impetum restitutionis exstinguet. Itaque planum jam fecimus, istam virtutem spatiationis ex calore et frigore in parte notabili non pendere, cum tamen sit ipsa illa virtus, quæ plurimum authoritatis his principiis tribuerit. Sequuntur duæ virtutes quæ omnibus in ore sunt, atque longe et late patent, per quas scilicet corpora massas sive congregationes majores rerum connaturalium petunt; in quarum observatione, ut in reliquis, aut nugantur homines aut plane aberrant. Schola enim communis satis habet, si motum naturalem a violento distinguat; et gravia deorsum, levia sursum ferri ex motu naturali pronuntiet. Verum parum proficiunt ad philosophiam hujusmodi speculationes. Ista enim natura, ars, violentia, compendia verborum sunt et nugæ. Debuerunt autem hunc motum non tantum ad naturam referre, sed etiam affectum et appetitum particularem et proprium corporis naturalis in hoc ipso motu quærere. Sunt enim et alii motus complures naturales ex passionibus rerum longe diversis. Itaque res secundum differentias proponenda est. Quin et ipsi illi motus quos violentos appellant magis secundum naturam appellari possint, quam iste quem vocant naturalem; si sit illud magis secundum naturam quod est fortius, aut etiam quod est magis ex ratione universi. Nam motus iste adscensus et descensus non admodum imperiosus est, nec etiam universalis, sed tanquam provincialis et secundum regiones; quin et aliis motibus obsequens et subjectus. Quod vero gravia deorsum ferri aiunt, levia sursum, idem est ac si dicerent, gravia esse gravia, levia levia. Quod enim prædicatur, id ex vi ipsa termini in subjecto assumitur. Si vero per grave densum, per leve rarum intelligunt, promovent nonnihil; ita tamen ut ad adjunctum et concomitans, potius quam ad causam, rem deducant. Qui vero gravium appetitum ita explicant, ut ad centrum terræ illa ferri contendant, levia ut[1] ad circumferentiam et ambitum cœli, tanquam ad loca propria; asserunt certe aliquid, atque etiam ad causam innuunt, sed omnino perperam. Loci enim nullæ sunt vires, neque corpus nisi a corpore patitur, atque omnis incitatio corporis, quæ videtur esse ad se collocandum, appetit atque molitur configurationem versus aliud corpus, non collocationem aut situm simplicem.

[1] So in the original; but the *ut* ought probably to be omitted. — *J. S.*

NEW ATLANTIS.[1]

[1] The *Thema Cœli*, had it stood by itself, would have followed here; for it belongs properly to this class, and was written before the *New Atlantis*. But being so closely connected with the *Descriptio Globi Intellectualis*, which belongs to the next, it was thought better not to separate them.—*J. S.*

PREFACE.

THE *New Atlantis* seems to have been written in 1624, and, though not finished, to have been intended for publication as it stands. It was published accordingly by Dr. Rawley in 1627, at the end of the volume containing the *Sylva Sylvarum;* for which place Bacon had himself designed it, the subjects of the two being so near akin; the one representing his idea of what should be the end of the work which in the other he supposed himself to be beginning. For the story of Solomon's House is nothing more than a vision of the practical results which he anticipated from the study of natural history diligently and systematically carried on through successive generations.

In this part of it, the work may probably be considered as complete. Of the state of Solomon's House he has told us all that he was as yet qualified to tell. His own attempts to "interpret nature" suggested the apparatus which was necessary for success: he had but to furnish Solomon's House with the instruments and preparations which he had himself felt the want of. The difficulties which had baffled his single efforts to provide that apparatus for himself suggested the constitution and regulations of a society formed to overcome them: he had but to furnish Solomon's House with the helps in head and hand which he had himself wished for. His own intellectual aspirations suggested the result: he had but to set down as known all that he himself most longed to know. But here he was obliged to stop. He could not describe the *process* of a perfect philosophical investigation; because it must of course have proceeded by the method of the *Novum Organum,* which was not yet expounded. Nor could he give a particular example of the result of such investigation, in the shape of a Form or an Axiom; for that presupposed the completion, not only of the *Novum Organum,* but (at least in some one subject)

of the Natural History also; and no portion of the Natural History complete enough for the purpose was as yet producible. Here therefore he stopped; and it would almost seem that the nature of the difficulty which stood in his way had reminded him of the course he ought to take; for just at this point (as we learn from Dr. Rawley) he did in fact leave his fable and return to his work. He had begun it with the intention of exhibiting a model political constitution, as well as a model college of natural philosophy; but "his desire of collecting the natural history diverted him, which he preferred many degrees before it." And in this, according to his own view of the matter, he was no doubt right; for though there are few people now who would not gladly give all the *Sylva Sylvarum*, had there been ten times as much of it, in exchange for an account of the laws, institutions, and administrative arrangements of Bensalem, it was not so with Bacon; who being deeper read in the phenomena of the human heart than in those of the material world, probably thought the perfect knowledge of nature an easier thing than the perfect government of men, — easier and not so far off; and therefore preferred to work where there was fairest hope of fruit.

To us, who can no longer hope for the fruits which Bacon expected, the *New Atlantis* is chiefly interesting as a record of his own feelings. Perhaps there is no single work of his which has so much of himself in it. The description of Solomon's House is the description of the vision in which he lived,—the vision not of an ideal world released from the natural conditions to which ours is subject, but of our own world as it might be made if we did our duty by it; of a state of things which he believed would one day be actually seen upon this earth such as it is by men such as we are; and the coming of which he believed that his own labours were sensibly hastening. The account of the manners and customs of the people of Bensalem is an account of his own taste in humanity; for a man's ideal, though not necessarily a description of what he is, is almost always an indication of what he would be; and in the sober piety, the serious cheerfulness, the tender and gracious courtesy, the open-handed hospitality, the fidelity in public and chastity in private life, the grave and graceful manners, the order, decency, and earnest industry, which prevail among these people, we recognise an image of himself

made perfect, — of that condition of the human soul which he loved in others, and aspired towards in himself. Even the dresses, the household arrangements, the order of their feasts and solemnities, their very gestures of welcome and salutation, have an interest and significance independent of the fiction, as so many records of Bacon's personal taste in such matters. Nor ought the stories which the Governor of the House of Strangers tells about the state of navigation and population in the early post-diluvian ages, to be regarded merely as romances invented to vary and enrich the narrative, but rather as belonging to a class of serious speculations to which Bacon's mind was prone. As in his visions of the future, embodied in the achievements of Solomon's House, there is nothing which he did not conceive to be really practicable by the means which he supposes to be used; so in his speculations concerning the past, embodied in the traditions of Bensalem, I doubt whether there be any (setting aside, of course, the particular history of the fabulous island) which he did not believe to be historically probable. Whether it were that the progress of the human race in knowledge and art seemed to him too small to be accounted for otherwise than by supposing occasional tempests of destruction, in which all that had been gathered was swept away, — or that the vicissitudes which had actually taken place during the short periods of which we know something had suggested to him the probability of similar accidents during those long tracts of time of which we know nothing, — or merely that the imagination is prone by nature to people darkness with shadows, — certain it is that the tendency was strong in Bacon to credit the past with wonders; to suppose that the world had brought forth greater things than it remembered, had seen periods of high civilisation buried in oblivion, great powers and peoples swept away and extinguished. In the year 1607, he avowed before the House of Commons a belief that in some forgotten period of her history (possibly during the Heptarchy) England had been far better peopled than she was then. In 1609, when he published the *De Sapientiâ Veterum*, he inclined to believe that an age of higher intellectual development than any the world then knew of had flourished and passed out of memory long before Homer and Hesiod wrote; and this upon the clearest and most deliberate review of all the obvious objections; and more deci-

dedly than he had done four years before when he published the *Advancement of Learning*. And I have little doubt that when he wrote the *New Atlantis* he thought it not improbable that the state of navigation in the world 3000 years before was really such as the Governor of the House of Strangers describes; that some such naval expeditions as those of Coya and Tyrambel may really have taken place; and that the early civilisation of the Great Atlantis may really have been drowned by a deluge and left to begin its career again from a state of mere barbarism.

Among the few works of fiction which Bacon attempted, the *New Atlantis* is much the most considerable; which gives an additional interest to it, and makes one the more regret that it was not finished according to the original design. Had it proceeded to the end in a manner worthy of the beginning, it would have stood, as a work of art, among the most perfect compositions of its kind.

The notes to this piece, which are not marked with Mr. Ellis's initials, are mine.

J. S.

NEW ATLANTIS:

A WORK UNFINISHED.

WRITTEN BY

THE RIGHT HONOURABLE

FRANCIS LORD VERULAM, VISCOUNT ST. ALBAN.

TO THE READER.

THIS fable my Lord devised, to the end that he might exhibit therein a model or description of a college instituted for the interpreting of nature and the producing of great and marvellous works for the benefit of men, under the name of Salomon's House, or the College of the Six Days' Works. And even so far his Lordship hath proceeded, as to finish that part. Certainly the model is more vast and high than can possibly be imitated in all things; notwithstanding most things therein are within men's power to effect. His Lordship thought also in this present fable to have composed a frame of Laws, or of the best state or mould of a commonwealth; but foreseeing it would be a long work, his desire of collecting the Natural History[1] diverted him, which he preferred many degrees before it.

This work of the *New Atlantis* (as much as concerneth the English edition) his Lordship designed for this place[2]; in regard it hath so near affinity (in one part of it) with the preceding Natural History.

W. RAWLEY.

[1] In the Latin translation Rawley adds, *aliarumque Instaurationis partium contexendarum;* alluding probably to the *De Augmentis*, the only portion of the Instauration, not belonging to the Natural History, which he seems to have been employed upon afterwards.

[2] It was published at the end of the volume containing the *Sylva Sylvarum*. The titlepage bears no date.

NEW ATLANTIS.

We sailed from Peru, (where we had continued by the space of one whole year,) for China and Japan, by the South Sea[1]; taking with us victuals for twelve months; and had good winds from the east, though soft and weak, for five months' space and more. But then the wind came about, and settled in the west for many days, so as we could make little or no way, and were sometimes in purpose to turn back. But then again there arose strong and great winds from the south, with a point east; which carried us up (for all that we could do) towards the north: by which time our victuals failed us, though we had made good spare of them. So that finding ourselves in the midst of the greatest wilderness of waters in the world, without victual, we gave ourselves for lost men, a d prepared for death. Yet we did lift up our hearts and voices to God above, who *showeth his wonders in the deep;* beseeching him of his mercy, that as in the beginning he discovered[2] the face of the deep, and brought forth dry land, so he would now discover land to us, that we might[3] not perish. And it came to pass that the next day about evening, we saw within a kenning before us, towards the north, as it were thick clouds, which did put us in some hope of land; knowing how that part of the South Sea was utterly unknown; and might have islands or continents, that hitherto were not come to light. Wherefore we bent our course thither, where we saw the appearance of land, all that night; and in the dawning of the next day, we might plainly discern that it was a land; flat to our sight, and full of boscage; which made it shew the

[1] The words "by the South Sea" are omitted in the translation.

[2] So in the original. If *discovered* be the right word, it must mean *removed the covering of* the face of the deep. But I think there must be some mistake. The Latin version has *quemadmodum in principio congregationes aquarum mandavit et Aridam apparere fecit.* The allusion is, no doubt, to Genes. i. 9.: "Let the waters under the heaven be gathered together unto one place, and let the dry land appear."

[3] *mought* in the original; a form of the word frequently, though not uniformly, adopted by Bacon. I have always substituted *might.*

more dark. And after an hour and a half's sailing, we entered into a good haven, being the port of a fair city; not great indeed, but well built, and that gave a pleasant view from the sea[1]: and we thinking every minute long till we were on land, came close to the shore, and offered to land. But straightways we saw divers of the people, with bastons in their hands, as it were forbidding us to land; yet without any cries or fierceness, but only as warning us off by signs that they made. Whereupon being not a little discomforted, we were advising with ourselves what we should do. During which time there made forth to us a small boat, with about eight persons in it; whereof one of them had in his hand a tipstaff of a yellow cane, tipped at both ends with blue, who came aboard our ship, without any show of distrust at all. And when he saw one of our number present himself somewhat afore the rest, he drew forth a little scroll of parchment, (somewhat yellower than our parchment, and shining like the leaves of writing tables, but otherwise soft and flexible,) and delivered it to our foremost man. In which scroll were written in ancient Hebrew, and in ancient Greek, and in good Latin of the School, and in Spanish, these words; "Land ye not, none of you; and provide to be gone from this coast within sixteen days, except you have further time given you. Meanwhile, if you want fresh water, or victual, or help for your sick, or that your ship needeth repair, write down your wants, and you shall have that which belongeth to mercy." This scroll was signed with a stamp of cherubins' wings, not spread but hanging downwards, and by them a cross. This being delivered, the officer returned, and left only a servant with us to receive our answer. Consulting hereupon amongst ourselves, we were much perplexed. The denial of landing and hasty warning us away troubled us much; on the other side, to find that the people had languages and were so full of humanity, did comfort us not a little. And above all, the sign of the cross to that instrument was to us a great rejoicing, and as it were a certain presage of good. Our answer was in the Spanish tongue; "That for our ship, it was well; for we had rather met with calms and contrary winds than any tempests. For our sick, they were many, and in very ill case; so that if they were not permitted to land, they ran danger of their lives." Our other wants we set down in parti-

[1] *ex qua parte Mare spectabat, elegantiam magnam præ se tulit.* — Lat. vers.

cular; adding, "that we had some little store of merchandise, which if it pleased them to deal for, it might supply our wants without being chargeable unto them." We offered some reward in pistolets unto the servant, and a piece of crimson velvet to be presented to the officer; but the servant took them not, nor would scarce look upon them; and so left us, and went back in another little boat which was sent for him.

About three hours after we had dispatched our answer, there came towards us a person (as it seemed) of place. He had on him a gown with wide sleeves, of a kind of water chamolet, of an excellent azure colour, far more glossy than ours; his under apparel was green; and so was his hat, being in the form of a turban, daintily made, and not so huge as the Turkish turbans; and the locks of his hair came down below the brims of it. A reverend man was he to behold. He came in a boat, gilt in some part of it, with four persons more only in that boat; and was followed by another boat, wherein were some twenty. When he was come within a flight-shot [1] of our ship, signs were made to us that we should send forth some to meet him upon the water; which we presently did in our ship-boat, sending the principal man amongst us save one, and four of our number with him. When we were come within six yards of their boat, they called to us to stay, and not to approach farther; which we did. And thereupon the man whom I before described stood up, and with a loud voice in Spanish, asked, "Are ye Christians?" We answered, "We were;" fearing the less, because of the cross we had seen in the subscription. At which answer the said person lifted up his right hand towards heaven, and drew it softly to his mouth, (which is the gesture they use when they thank God,) and then said: "If ye will swear (all of you) by the merits of the Saviour that ye are no pirates, nor have shed blood lawfully nor unlawfully within forty days past, you may have licence to come on land." We said, "We were all ready to take that oath." Whereupon one of those that were with him, being (as it seemed) a notary, made an entry of this act. Which done, another of the attendants of the great person, which was with him in the same boat, after his lord had spoken a little to him, said aloud;

[1] *spiculi jactum.* When archers try which can shoot furthest, they call it flight-shooting. The distance would be between 200 and 300 yards. Old Double, according to Justice Shallow, would have "carried you a forehand shaft a fourteen and fourteen and half;" that is, 284 or 294 yards. See Hen. IV. Part II. act 3. sc. 2.

"My lord would have you know, that it is not of pride or greatness that he cometh not aboard your ship; but for that in your answer you declare that you have many sick amongst you, he was warned by the Conservator of Health of the city that he should keep a distance." We bowed ourselves towards him, and answered, "We were his humble servants; and accounted for great honour and singular humanity towards us that which was already done; but hoped well that the nature of the sickness of our men was not infectious." So he returned; and a while after came the notary to us aboard our ship; holding in his hand a fruit of that country, like an orange, but of colour between orange-tawney and scarlet, which cast a most excellent odour. He used it (as it seemeth) for a preservative against infection. He gave us our oath; "By the name of Jesus and his merits:" and after told us that the next day by six of the clock in the morning we should be sent to, and brought to the Strangers' House, (so he called it,) where we should be accommodated of things both for our whole and for our sick. So he left us; and when we[1] offered him some pistolets, he smiling said, "He must not be twice paid for one labour:" meaning (as I take it) that he had salary sufficient of the state for his service. For (as I after learned) they call an officer that taketh rewards, *twice paid.*

The next morning early, there came to us the same officer that came to us at first with his cane, and told us, "He came to conduct us to the Strangers' House; and that he had prevented the hour, because we might have the whole day before us for ur business. "For," said he, "if you will follow my advice, there shall first go with me some few of you, and see the place, and how it may be made convenient for you; and then you may send for your sick, and the rest of your number which ye will bring on land." We thanked him, and said, "That this care which he took of desolate strangers God would reward." And so six of us went on land with him: and when we were on land, he went before us, and turned to us, and said[2], "He was but our servant, and our guide." He led us through three fair streets; and all the way we went there were gathered some people on both sides standing in a row; but in so civil a fashion, as if it had been not to wonder at us[3] but to welcome

[1] So ed. 1635. Ed. 1629 has *he.*

[2] *et dixit, perhumanè certè, &c.*

[3] *ut viderentur non tam ad otiosum spectaculum convenisse quam &c.*

us; and divers of them, as we passed by them, put their arms a little abroad; which is their gesture when they bid any welcome. The Strangers' House is a fair and spacious house, built of brick, of somewhat a bluer colour than our brick; and with handsome windows, some of glass, some of a kind of cambric oiled. He brought us first into a fair parlour above stairs, and then asked us, "What number of persons we were? And how many sick?" We answered, "We were in all (sick and whole) one and fifty persons, whereof our sick were seventeen." He desired us to have patience a little, and to stay till he came back to us; which was about an hour after; and then he led us to see the chambers which were provided for us, being in number nineteen: they having cast it (as it seemeth) that four of those chambers, which were better than the rest, might receive four of the principal men of our company, and lodge them alone by themselves; and the other fifteen chambers were to lodge us two and two together. The chambers were handsome and cheerful chambers, and furnished civilly. Then he led us to a long gallery, like a dorture[1], where he showed us all along the one side (for the other side was but wall and window) seventeen cells, very neat ones, having partitions of cedar wood. Which gallery and cells, being in all forty, (many more than we needed,) were instituted as an infirmary for sick persons. And he told us withal, that as any of our sick waxed well, he might be removed from his cell to a chamber; for which purpose there were set forth ten spare chambers, besides the number we spake of before. This done, he brought us back to the parlour, and lifting up his cane a little, (as they do when they give any charge or command[2],) said to us, "Ye are to know that the custom of the land requireth, that after this day and to-morrow, (which we give you for removing of your people from your ship,) you are to keep within doors for three days. But let it not trouble you, nor do not think yourselves restrained, but rather left to your rest and ease. You shall want nothing, and there are six of our people appointed to attend you, for any business you may have abroad." We gave him thanks with all affection and respect, and said, "God surely is manifested in this land.' We offered him also twenty pistolets; but he smiled, and only

[1] Dormitory. The Latin translation has, *qualia solent esse dormitoria monachorum*.
[2] *i. e.*, any charge which they have received from superior authority — (*quod in more illis erat quoties ministri mandata superiorum referunt*).

said; "What? twice paid!" And so he left us. Soon after our dinner was served in; which was right good viands, both for bread and meat[1]: better than any collegiate diet that I have known in Europe. We had also drink of three sorts, all wholesome and good; wine of the grape; a drink of grain, such as is with us our ale, but more clear; and a kind of cider made of a fruit of that country; a wonderful pleasing and refreshing drink. Besides, there were brought in to us great store of those scarlet oranges for our sick; which (they said) were an assured remedy for sickness taken at sea. There was given us also a box of small grey or whitish pills, which they wished our sick should take, one of the pills every night before sleep; which (they said) would hasten their recovery. The next day, after that our trouble of carriage and removing of our men and goods out of our ship was somewhat settled and quiet, I thought good to call our company together; and when they were assembled said unto them; "My dear friends, let us know ourselves, and how it standeth with us. We are men cast on land, as Jonas was out of the whale's belly, when we were as buried in the deep: and now we are on land, we are but between death and life; for we are beyond both the old world and the new; and whether ever we shall see Europe, God only knoweth. It is a kind of miracle hath brought us hither: and it must be little less that shall bring us hence. Therefore in regard of our deliverance past, and our danger present and to come, let us look up to God, and every man reform his own ways. Besides we are come here amongst a Christian people, full of piety and humanity: let us not bring that confusion of face upon ourselves, as to show our vices or unworthiness before them. Yet there is more. For they have by commandment (though in form of courtesy) cloistered us within these walls for three days: who knoweth whether it be not to take some taste of our manners and conditions? and if they find them bad, to banish us straightways; if good, to give us further time. For these men that they have given us for attendance may withal have an eye upon us. Therefore for God's love, and as we love the weal of our souls and bodies, let us so behave ourselves as we may be at peace with God, and may find grace in the eyes of this people." Our company with

[1] The translation has both for meat and *drink; tam respectu ciborum quam potûs:* and in the next line but one, *Potus erat trium generum, &c.*

one voice thanked me for my good admonition, and promised me to live soberly and civilly, and without giving any the least occasion of offence. So we spent our three days joyfully and without care, in expectation what would be done with us when they were expired. During which time, we had every hour joy of the amendment of our sick; who thought themselves cast into some divine pool of healing, they mended so kindly and so fast.

The morrow after our three days were past, there came to us a new man that we had not seen before, clothed in blue as the former was, save that his turban was white, with a small red cross on the top. He had also a tippet of fine linen. At his coming in, he did bend to us a little, and put his arms abroad. We of our parts saluted him in a very lowly and submissive manner; as looking that from him we should receive sentence of life or death. He desired to speak with some few of us: whereupon six of us only stayed, and the rest avoided the room. He said, "I am by office governor of this House of Strangers, and by vocation I am a Christian priest; and therefore am come to you to offer you my service, both as strangers and chiefly as Christians. Some things I may tell you, which I think you will not be unwilling to hear. The state hath given you licence to stay on land for the space of six weeks: and let it not trouble you if your occasions ask further time, for the law in this point is not precise; and I do not doubt but myself shall be able to obtain for you such further time as may be convenient. Ye shall also understand, that the Strangers' House is at this time rich, and much aforehand; for it hath laid up revenue these thirty-seven years; for so long it is since any stranger arrived in this part: and therefore take ye no care; the state will defray you all the time you stay; neither shall you stay one day the less for that. As for any merchandise ye have brought, ye shall be well used, and have your return either in merchandise or in gold and silver: for to us it is all one. And if you have any other request to make, hide it not. For ye shall find we will not make your countenance to fall by the answer ye shall receive. Only this I must tell you, that none of you must go above a *karan*" (that is with them a mile and an half) "from the walls of the city, without especial leave.' We answered, after we had looked awhile one upon another' admiring this gracious and parent-like usage; "That we could

not tell what to say: for we wanted words to express our thanks; and his noble free offers left us nothing to ask. It seemed to us that we had before us a picture of our salvation in heaven; for we that were awhile since in the jaws of death, were now brought into a place where we found nothing but consolations. For the commandment laid upon us, we would not fail to obey it, though it was impossible but our hearts should be inflamed to tread further upon this happy and holy ground." We added; "That our tongues should first cleave to the roofs of our mouths, ere we should forget either his reverend person or this whole nation in our prayers." We also most humbly besought him to accept of us as his true servants, by as just a right as ever men on earth were bounden; laying and presenting both our persons and all we had at his feet. He said; "He was a priest, and looked for a priest's reward: which was our brotherly love and the good of our souls and bodies." So he went from us, not without tears of tenderness in his eyes; and left us also confused with joy and kindness, saying amongst ourselves, "That we were come into a land of angels, which did appear to us daily and prevent us with comforts, which we thought not of, much less expected."

The next day, about ten of the clock, the governor came to us again, and after salutations said familiarly, "That he was come to visit us": and called for a chair, and sat him down: and we, being some ten of us, (the rest were of the meaner sort, or else gone abroad,) sat down with him. And when we were set, he began thus: "We of this island of Bensalem," (for so they call it in their language,) "have this; that by means of our solitary situation, and of the laws of secrecy which we have for our travellers, and our rare admission of strangers, we know well most part of the habitable world, and are ourselves unknown. Therefore because he that knoweth least is fittest to ask questions, it is more reason, for the entertainment of the time, that ye ask me questions, than that I ask you." We answered; "That we humbly thanked him that he would give us leave so to do: and that we conceived by the taste we had already, that there was no worldly thing on earth more worthy to be known than the state of that happy land. But above all," (we said,) "since that we were met from the several ends of the world, and hoped assuredly that we should meet one day in the kingdom of heaven, (for that we were both parts Christians,) we

desired to know (in respect that land was so remote, and so divided by vast and unknown seas, from the land where our Saviour walked on earth,) who was the apostle of that nation, and how it was converted to the faith?" It appeared in his face that he took great contentment in this our question: he said, "Ye knit my heart to you, by asking this question in the first place; for it sheweth that you *first seek the kingdom of heaven;* and I shall gladly and briefly satisfy your demand.

"About twenty years after the ascension of our Saviour, it came to pass that there was seen by the people of Renfusa, (a city upon the eastern coast of our island,) within night, (the night was cloudy and calm,) as it might be some mile into the sea, a great pillar of light; not sharp, but in form of a column or cylinder, rising from the sea a great way up towards heaven: and on the top of it was seen a large cross of light, more bright and resplendent than the body of the pillar. Upon which so strange a spectacle, the people of the city gathered apace together upon the sands, to wonder; and so after put themselves into a number of small boats, to go nearer to this marvellous sight. But when the boats were come within about sixty yards of the pillar, they found themselves all bound, and could go no further; yet so as they might move to go about, but might not approach nearer: so as the boats stood all as in a theatre, beholding this light as an heavenly sign.[1] It so fell out, that there was in one of the boats one of the wise men of the society of Salomon's House; which house or college (my good brethren) is the very eye of this kingdom; who having awhile attentively and devoutly viewed and contemplated this pillar and cross, fell down upon his face; and then raised himself upon his knees, and lifting up his hands to heaven, made his prayers in this manner:

"'Lord God of heaven and earth, thou hast vouchsafed of thy grace to those of our order, to know thy works of creation, and the secrets of them; and to discern (as far as appertaineth to the generations of men) between divine miracles, works of nature, works of art, and impostures and illusions of all sorts.[2] I do here acknowledge and testify before this people, that the thing which we now see before our eyes is thy Finger and a true Miracle; and forasmuch as we learn in our books that

[1] *tanquam* scenam *cœlestem*, in the translation.
[2] *illusiones dæmonum, cum imposturis omnimodis.*

thou never workest miracles but to a divine and excellent end, (for the laws of nature are thine own laws, and thou exceedest them not but upon great cause,) we most humbly beseech thee to prosper this great sign, and to give us the interpretation and use of it in mercy; which thou dost in some part secretly promise by sending it unto us.'

"When he had made his prayer, he presently found the boat he was in moveable and unbound; whereas all the rest remained still fast; and taking that for an assurance of leave to approach, he caused the boat to be softly and with silence rowed towards the pillar. But ere he came near it, the pillar and cross of light brake up, and cast itself abroad, as it were, into a firmament of many stars; which also vanished soon after, and there was nothing left to be seen but a small ark or chest of cedar, dry, and not wet at all with water, though it swam. And in the fore-end of it, which was towards him, grew a small green branch of palm; and when the wise man had taken it with all reverence into his boat, it opened of itself, and there were found in it a Book and a Letter; both written in fine parchment, and wrapped in sindons of linen. The Book contained all the canonical books of the Old and New Testament, according as you have them, (for we know well what the Churches with you receive); and the Apocalypse itself[1], and some other books of the New Testament which were not at that time written, were nevertheless in the Book. And for the Letter, it was in these words:

"'I Bartholomew, a servant of the Highest, and Apostle of Jesus Christ, was warned by an angel that appeared to me in a vision of glory, that I should commit this ark to the floods of the sea. Therefore I do testify and declare unto that people where God shall ordain this ark to come to land, that in the same day is come unto them salvation and peace and goodwill, from the Father, and from the Lord Jesus.'

"There was also in both these writings, as well the Book as the Letter, wrought a great miracle, conform to that of the Apostles in the original Gift of Tongues. For there being at that time in this land Hebrews, Persians, and Indians, besides the natives, every one read upon the Book and Letter, as if

[1] The original has a semicolon after "itself," which would seem to connect this clause with the last. But the translation (*Apocalypsis ipsa*) shows that it was meant to be the beginning of a new sentence.

they had been written in his own language. And thus was this land saved from infidelity (as the remain of the old world was from water) by an ark, through the apostolical and miraculous evangelism of St. Bartholomew." And here he paused, and a messenger came, and called him from us. So this was all that passed in that conference.

The next day, the same governor came again to us immediately after dinner, and excused himself, saying, "That the day before he was called from us somewhat abruptly, but now he would make us amends, and spend time with us, if we held his company and conference agreeable." We answered, "That we held it so agreeable and pleasing to us, as we forgot both dangers past and fears to come, for the time we heard him speak; and that we thought an hour spent with him, was worth years of our former life." He bowed himself a little to us, and after we were set again, he said; "Well, the questions are on your part." One of our number said, after a little pause; "That there was a matter we were no less desirous to know, than fearful to ask, lest we might presume too far. But encouraged by his rare humanity towards us, (that could scarce think ourselves strangers, being his vowed and professed servants,) we would take the hardiness to propound it: humbly beseeching him, if he thought it not fit to be answered, that he would pardon it, though he rejected it." We said; "We well observed those his words, which he formerly spake, that this happy island where we now stood was known to few, and yet knew most of the nations of the world; which we found to be true, considering they had the languages of Europe, and knew much of our state and business; and yet we in Europe (notwithstanding all the remote discoveries and navigations of this last age,) never heard any of the least inkling or glimpse of this island. This we found wonderful strange; for that all nations have inter-knowledge[1] one of another either by voyage into foreign parts, or by strangers that come to them: and though the traveller into a foreign country doth commonly know more by the eye, than he that stayeth at home can by relation of the traveller; yet both ways suffice to make a mutual knowledge, in some degree, on both parts. But for this island, we never heard tell of any ship of theirs that had been seen to arrive

[1] *enterknowledge* in the original.

upon any shore of Europe; no, nor of either the East or West Indies; nor yet of any ship of any other part of the world that had made return from them. And yet the marvel rested not in this. For the situation of it (as his lordship said) in the secret conclave of such a vast sea might cause it. But then that they should have knowledge of the languages, books, affairs, of those that lie such a distance from them, it was a thing we could not tell what to make of; for that it seemed to us a condition and propriety of divine powers and beings, to be hidden and unseen to others, and yet to have others open and as in a light to them." At this speech the governor gave a gracious smile, and said; "That we did well to ask pardon for this question we now asked; for that it imported as if we thought this land a land of magicians, that sent forth spirits of the air into all parts, to bring them news and intelligence of other countries." It was answered by us all, in all possible humbleness, but yet with a countenance taking knowledge that we knew that he spake it but merrily, "That we were apt enough to think there was somewhat supernatural in this island; but yet rather as angelical than magical. But to let his lordship know truly what it was that made us tender and doubtful to ask this question, it was not any such conceit, but because we remembered he had given a touch in his former speech, that this land had laws of secrecy touching strangers." To this he said; "You remember it aright; and therefore in that I shall say to you I must reserve some particulars, which it is not lawful for me to reveal; but there will be enough left to give you satisfaction.

"You shall understand (that which perhaps you will scarce think credible) that about three thousand years ago, or somewhat more, the navigation of the world, (specially for remote voyages,) was greater than at this day. Do not think with yourselves that I know not how much it is increased with you within these six-score years: I know it well: and yet I say greater then than now; whether it was, that the example of the ark, that saved the remnant of men from the universal deluge, gave men confidence to adventure upon the waters; or what it was; but such is the truth. The Phœnicians, and especially the Tyrians, had great fleets. So had the Carthaginians, their colony, which is yet further west. Toward the east, the shipping of Egypt and of Palestina was likewise

great. China also, and the great Atlantis (that you call America), which have now but junks and canoes [1], abounded then in tall ships. This island (as appeareth by faithful registers of those times) had then fifteen hundred strong ships, of great content. Of all this there is with you sparing memory, or none; but we have large knowledge thereof.

"At that time, this land was known and frequented by the ships and vessels of all the nations before named. And (as it cometh to pass) they had many times men of other countries, that were no sailors, that came with them; as Persians, Chaldeans, Arabians; so as almost all nations of might and fame resorted hither; of whom we have some stirps and little tribes with us at this day. And for our own ships, they went sundry voyages, as well to your Straits, which you call the Pillars of Hercules [2], as to other parts in the Atlantic and Mediterrane Seas; as to Paguin [3] (which is the same with Cambaline [4]) and Quinzy [5], upon the Oriental Seas, as far as to the borders of the East Tartary.

"At the same time, and an age after, or more, the inhabitants of the great Atlantis did flourish.[6] For though the narration and description which is made by a great man with you, that the descendants of Neptune planted there; and of the magnificent temple, palace, city, and hill; and the manifold streams of goodly navigable rivers, (which, as so many chains, environed the same site and temple); and the several degrees of ascent whereby men did climb up to the same, as

[1] *Canoa's* in the original.

[2] Hercules is called by Edrisi Dhoulcarnain. He says he lived in the time of Abraham, and has been confounded with Iscander Dhoulcarnain, or Alexander the two-horned. That the limits beyond which it is impossible to pass were set up by Dhoulcarnain gives the obvious explanation of the passage in Chaucer's *Troilus and Cressida*: —

> "I am tyl God me bettre mynde sende,
> At Dulcarnon, right at my wytte's end,"

"qui interpretes mire torsit."—*R. L. E.*

[3] Peking. It seems as if Bacon supposed that Peking was a sea-port. — *R. L. E.* [The translation adds *civitatem in Chinâ antiquissimam.*]

[4] Cambalu is the reading of the common text of Marco Polo. The word is properly Khambalik. It is the Tartar name for Peking. — *R. L. E.* [It is *Cambalu* in the translation; and in the English Bacon probably wrote *Cambalue.* — *J. S.*]

[5] The Quinsai of Marco Polo, now Hangchowfoo. — *R. L. E.*

[6] See Plato, Critias, p. 113., and Timæus, p. 25. Everything relating to the story of Atlantis has been collected by Humboldt, *Examen critique de l'Histoire de la Géographie*, &c., i. p. 167. Compare Martin, *Etudes sur le Timée*; and see Gesenius, *Monumenta Phœnicia*, for an account of a spurious Phœnician inscription, purporting to give the history of the destruction of Atlantis. It may be a question whether there be not some affinity between Atlantis and Homer's Phæacia. — *R. L. E.*

if it had been a *scala cœli;* be all poetical and fabulous: yet so much is true, that the said country of Atlantis, as well that of Peru, then called Coya, as that of Mexico, then named Tyrambel, were mighty and proud kingdoms in arms, shipping, and riches: so mighty, as at one time (or at least within the space of ten years) they both made two great expeditions; they of Tyrambel through the Atlantic to the Mediterrane Sea; and they of Coya through the South Sea upon this our island. And for the former of these, which was into Europe, the same author amongst you (as it seemeth) had some relation from the Egyptian priest whom he citeth. For assuredly such a thing there was. But whether it were the ancient Athenians that had the glory of the repulse and resistance of those forces, I can say nothing: but certain it is, there never came back either ship or man from that voyage. Neither had the other voyage of those of Coya upon us had better fortune, if they had not met with enemies of greater clemency. For the king of this island (by name Altabin) a wise man and a great warrior, knowing well both his own strength and that of his enemies, handled the matter so, as he cut off their land-forces from their ships; and entoiled both their navy and their camp with a greater power than theirs, both by sea and land; and compelled them to render themselves without striking stroke: and after they were at his mercy, contenting himself only with their oath that they should no more bear arms against him, dismissed them all in safety. But the Divine Revenge overtook not long after those proud enterprises. For within less than the space of one hundred years, the great Atlantis was utterly lost and destroyed: not by a great earthquake, as your man saith, (for that whole tract is little subject to earthquakes,) but by a particular deluge or inundation; those countries having, at this day, far greater rivers and far higher mountains to pour down waters, than any part of the old world. But it is true that the same inundation was not deep; not past forty foot, in most places, from the ground: so that although it destroyed man and beast generally, yet some few wild inhabitants of the wood[1] escaped. Birds also were saved by flying to the high trees and woods. For as for men, although they had buildings in many places higher than the

[1] The translation says, of the *mountains: silvestres habitatores quidam montium.*

depth of the water, yet that inundation, though it were shallow, had a long continuance; whereby they of the vale that were not drowned, perished for want of food and other things necessary. So as marvel you not at the thin population of America, nor at the rudeness and ignorance of the people; for you must account your inhabitants of America as a young people; younger a thousand years, at the least, than the rest of the world; for that there was so much time between the universal flood and their particular inundation. For the poor remnant of human seed which remained in their mountains peopled the country again slowly, by little and little; and being simple and savage people, (not like Noah and his sons, which was the chief family of the earth,) they were not able to leave letters, arts, and civility to their posterity; and having likewise in their mountainous habitations been used (in respect of the extreme cold of those regions) to clothe themselves with the skins of tigers, bears, and great hairy goats, that they have in those parts; when after they came down into the valley, and found the intolerable heats which are there, and knew no means of lighter apparel, they were forced to begin the custom of going naked, which continueth at this day. Only they take great pride and delight in the feathers of birds, and this also they took from those their ancestors of the mountains, who were invited unto it by the infinite flights of birds that came up to the high grounds, while the waters stood below. So you see, by this main accident of time, we lost our traffic with the Americans, with whom of all others, in regard they lay nearest to us, we had most commerce. As for the other parts of the world, it is most manifest that in the ages following (whether it were in respect of wars, or by a natural revolution of time,) navigation did every where greatly decay; and specially far voyages (the rather by the use of galleys[1], and such vessels as could hardly brook the ocean,) were altogether left and omitted. So then, that part of intercourse[2] which could be from other nations to sail to us, you see how it hath long since ceased; except it were by some rare accident, as this of yours. But now of the cessation of that other part of intercourse, which might be by our sailing to other nations, I must yield you some other cause. For I cannot say (if I shall say truly,) but

[1] *propterea quod triremes . . . in usum venire cœperunt.*
[2] *entercourse* in orig.

our shipping, for number, strength, mariners, pilots, and all things that appertain to navigation, is as great as ever: and therefore why we should sit at home, I shall now give you an account by itself: and it will draw nearer to give you satisfaction to your principal question.

"There reigned in this island, about nineteen hundred years ago, a King, whose memory of all others we most adore; not superstitiously, but as a divine instrument, though a mortal man; his name was Solamona: and we esteem him as the lawgiver of our nation. This king had a *large heart*, inscrutable for good; and was wholly bent to make his kingdom and people happy. He therefore, taking into consideration how sufficient and substantive this land was to maintain itself without any aid at all of the foreigner; being five thousand six hundred miles in circuit, and of rare fertility of soil in the greatest part thereof; and finding also the shipping of this country might be plentifully set on work, both by fishing and by transportations from port to port, and likewise by sailing unto some small islands that are not far from us, and are under the crown and laws of this state; and recalling into his memory the happy and flourishing estate wherein this land then was, so as it might be a thousand ways altered to the worse, but scarce any one way to the better; thought nothing wanted to his noble and heroical intentions, but only (as far as human foresight might reach) to give perpetuity to that which was in his time so happily established. Therefore amongst his other fundamental laws of this kingdom, he did ordain the interdicts and prohibitions which we have touching entrance of strangers; which at that time (though it was after the calamity of America) was frequent; doubting novelties, and commixture of manners. It is true, the like law against the admission of strangers without licence is an ancient law in the kingdom of China, and yet continued in use. But there it is a poor thing; and hath made them a curious, ignorant, fearful, foolish nation. But our lawgiver made his law of another temper. For first, he hath preserved all points of humanity, in taking order and making provision for the relief of strangers distressed; whereof you have tasted." At which speech (as reason was) we all rose up, and bowed ourselves. He went on. "That king also, still desiring to join humanity and policy together; and thinking it against humanity to detain strangers here against their wills,

and against policy that they should return and discover their knowledge of this estate, he took this course: he did ordain that of the strangers that should be permitted to land, as many (at all times) might depart as would; but as many as would stay should have very good conditions and means to live from the state. Wherein he saw so far, that now in so many ages since the prohibition, we have memory not of one ship that ever returned; and but of thirteen persons only, at several times, that chose to return in our bottoms. What those few that returned may have reported abroad I know not. But you must think, whatsoever they have said could be taken where they came but for a dream. Now for our travelling from hence into parts abroad, our Lawgiver thought fit altogether to restrain it. So is it not in China. For the Chineses sail where they will or can; which sheweth that their law of keeping out strangers is a law of pusillanimity and fear. But this restraint of ours hath one only exception, which is admirable; preserving the good which cometh by communicating with strangers, and avoiding the hurt; and I will now open it to you. And here I shall seem a little to digress, but you will by and by find it pertinent. Ye shall understand (my dear friends) that amongst the excellent acts of that king, one above all hath the pre-eminence. It was the erection and institution of an Order or Society which we call *Salomon's House;* the noblest foundation (as we think) that ever was upon the earth; and the lanthorn of this kingdom. It is dedicated to the study of the Works and Creatures of God. Some think it beareth the founder's name a little corrupted, as if it should be Solamona's House. But the records write it as it is spoken. So as I take it to be denominate of the King of the Hebrews, which is famous with you, and no stranger to us. For we have some parts of his works which with you are lost; namely, that Natural History which he wrote, of all plants, from the *cedar of Libanus* to the *moss that groweth out of the wall*, and of all *things that have life and motion.* This maketh me think that our king, finding himself to symbolize in many things with that king of the Hebrews (which lived many years before him), honoured him with the title of this foundation.[1] And I am the rather

[1] Bacon in speaking of this king who symbolizes with Solomon seems to allude to James I. — *R. L. E.* [If the *New Atlantis* had been written in the earlier part of James's reign, Bacon might have been suspected perhaps of some such allusion. He

induced to be of this opinion, for that I find in ancient records this Order or Society is sometimes called Salomon's House, and sometimes the College of the Six Days Works; whereby I am satisfied that our excellent king had learned from the Hebrews that God had created the world and all that therein is within six days; and therefore he instituting that House for the finding out of the true nature of all things[1], (whereby God might have the more glory in the workmanship of them, and men the more fruit in the use of them,) did give it also that second name. But now to come to our present purpose. When the king had forbidden to all his people navigation into any part that was not under his crown, he made nevertheless this ordinance; That every twelve years there should be set forth out of this kingdom two ships, appointed to several voyages; That in either of these ships there should be a mission of three of the Fellows or Brethren of Salomon's House; whose errand was only to give us knowledge of the affairs and state of those countries to which they were designed, and especially of the sciences, arts, manufactures, and inventions of all the world; and withal to bring unto us books, instruments, and patterns in every kind; That the ships, after they had landed the brethren, should return; and that the brethren should stay abroad till the new mission. These ships are not otherwise fraught, than with store of victuals, and good quantity of treasure to remain with the brethren, for the buying of such things and rewarding of such persons as they should think fit. Now for me to tell you how the vulgar sort of mariners are contained from being discovered at land; and how they that must be put on shore for any time, colour themselves under the names of other nations; and to what places these voyages have been designed; and what places of *rendez-vous* are appointed for the new missions; and the like circumstances of the practique; I may not do it: neither is it much to your desire. But thus you see we maintain a trade, not for gold, silver, or jewels; nor for silks; nor for spices; nor any other

might have hoped to encourage James to justify the parallel by going and doing likewise. But since James had now reigned above 20 years without doing or attempting to do anything for the furtherance of Natural Philosophy; without showing any interest in it or any taste or capacity for it; I cannot understand what the allusion can be or where the resemblance. Nor does it seem necessary to suppose anything of the kind in order to explain why a model-king for wisdom and knowledge should be likened to Solomon. — *J. S.*]

[1] *ad inquisitionem et inventionem naturæ veræ et interioris rerum omnium.*

commodity of matter; but only for God's first creature, which was *Light:* to have *light* (I say) of the growth of all parts of the world."[1] And when he had said this, he was silent; and so were we all. For indeed we were all astonished to hear so strange things so probably told. And he, perceiving that we were willing to say somewhat but had it not ready, in great courtesy took us off, and descended to ask us questions of our voyage and fortunes; and in the end concluded, that we might do well to think with ourselves what time of stay we would demand of the state; and bade us not to scant ourselves; for he would procure such time as we desired. Whereupon we all rose up, and presented ourselves to kiss the skirt of his tippet; but he would not suffer us; and so took his leave. But when it came once amongst our people that the state used to offer conditions to strangers that would stay, we had work enough to get any of our men to look to our ship, and to keep them from going presently to the governor to crave conditions. But with much ado we refrained them, till we might agree what course to take.

We took ourselves now for free men, seeing there was no danger of our utter perdition; and lived most joyfully, going abroad and seeing what was to be seen in the city and places adjacent within our tedder; and obtaining acquaintance with many of the city, not of the meanest quality; at whose hands we found such humanity, and such a freedom and desire to take strangers as it were into their bosom, as was enough to make us forget all that was dear to us in our own countries: and continually we met with many things right worthy of observation and relation; as indeed, if there be a mirror in the world worthy to hold men's eyes, it is that country. One day there were two of our company bidden to a Feast of the Family, as they call it. A most natural, pious, and reverend custom it is, shewing that nation to be compounded of all goodness. This is the manner of it. It is granted to any man that shall live to see thirty persons descended of his body alive together, and all above three years old, to make this feast; which is done at the cost of the state. The Father of the Family, whom they call the *Tirsan,* two days before the feast, taketh to him three of such friends as he liketh to choose; and is assisted also by

[1] *i. e.,* in whatever parts of the world it is to be found. *Luce, inquam, in quacunque tandem terræ regione prorumpente et germinante.*

the governor of the city or place where the feast is celebrated; and all the persons of the family, of both sexes, are summoned to attend him. These two days the Tirsan sitteth in consultation concerning the good estate of the family. There, if there be any discord or suits between any of the family, they are compounded and appeased. There, if any of the family be distressed or decayed, order is taken for their relief and competent means to live. There, if any be subject to vice, or take ill courses, they are reproved and censured. So likewise direction is given touching marriages, and the courses of life which any of them should take, with divers other the like orders and advices. The governor assisteth, to the end to put in execution by his public authority the decrees and orders of the Tirsan, if they should be disobeyed; though that seldom needeth; such reverence and obedience they give to the order of nature. The Tirsan doth also then ever choose one man from amongst his sons, to live in house with him: who is called ever after the Son of the Vine. The reason will hereafter appear. On the feast-day, the Father or Tirsan cometh forth after divine service into a large room where the feast is celebrated; which room hath an half-pace[1] at the upper end. Against the wall, in the middle of the half-pace, is a chair placed for him, with a table and carpet before it. Over the chair is a state[2], made round or oval, and it is of ivy; an ivy somewhat whiter than ours, like the leaf of a silver asp, but more shining; for it is green all winter. And the state is curiously wrought with silver and silk of divers colours, broiding or binding in the ivy; and is ever of the work of some of the daughters of the family; and veiled over at the top with a fine net of silk and silver. But the substance of it is true ivy; whereof, after it is taken down, the friends of the family are desirous to have some leaf or sprig to keep. The Tirsan cometh forth with all his generation or lineage[3], the males before him, and the females following him; and if there be a mother from whose body the whole lineage is descended, there is a traverse placed in a loft above on the right

[1] Half-pace or dais, the part raised by a low step above the rest of the floor. — *R. L. E.*

[2] *i. e.* a canopy, *conopeum*.

[3] *linage* in the original; which seems to be the proper form of the word. The *e* may have been introduced originally as a direction for the lengthening of the first syllable; and then the resemblance of the word to such words as *lineal* may have suggested the modern pronunciation.

hand of the chair, with a privy door, and a carved window of glass, leaded with gold and blue; where she sitteth, but is not seen. When the Tirsan is come forth, he sitteth down in the chair; and all the lineage place themselves against the wall, both at his back and upon the return of the half-pace[1], in order of their years without difference of sex; and stand upon their feet. When he is set; the room being always full of company, but well kept and without disorder; after some pause there cometh in from the lower end of the room a *Taratan* (which is as much as an herald) and on either side of him two young lads; whereof one carrieth a scroll of their shining yellow parchment; and the other a cluster of grapes of gold, with a long foot or stalk. The herald and children are clothed with mantles of sea-water green sattin; but the herald's mantle is streamed with gold, and hath a train. Then the herald with three curtesies, or rather inclinations, cometh up as far as the half-pace; and there first taketh into his hand the scroll. This scroll is the King's Charter, containing gift of revenew, and many privileges, exemptions, and points of honour, granted to the Father of the Family; and is ever styled and directed, *To such an one our well-beloved friend and creditor:* which is a title proper only to this case. For they say the king is debtor to no man, but for propagation of his subjects. The seal set to the king's charter is the king's image, imbossed or moulded in gold; and though such charters be expedited of course, and as of right, yet they are varied by discretion, according to the number and dignity of the family. This charter the herald readeth aloud; and while it is read, the father or Tirsan standeth up, supported by two of his sons, such as he chooseth. Then the herald mounteth the half-pace, and delivereth the charter into his hand: and with that there is an acclamation by all that are present in their language, which is thus much: *Happy are the people of Bensalem.* Then the herald taketh into his hand from the other child the cluster of grapes, which is of gold, both the stalk and the grapes. But the grapes are daintily enamelled; and if the males of the family be the greater number, the grapes are enamelled purple, with a little sun set on the top; if the females, then they are enamelled into a greenish

[1] *juxta parietem, tam a tergo quam a lateribus aulæ, super gradum ascensûs.*

yellow, with a crescent on the top. The grapes are in number as many as there are descendants of the family. This golden cluster the herald delivereth also to the Tirsan; who presently delivereth it over to that son that he had formerly chosen to be in house with him: who beareth it before his father as an ensign of honour when he goeth in public, ever after; and is thereupon called the Son of the Vine. After this ceremony ended, the father or Tirsan retireth; and after some time cometh forth again to dinner, where he sitteth alone under the state, as before; and none of his descendants sit with him, of what degree or dignity soever, except he hap to be of Salomon's House. He is served only by his own children, such as are male; who perform unto him all service of the table upon the knee; and the women only stand about him, leaning against the wall. The room below the half-pace hath tables on the sides for the guests that are bidden; who are served with great and comely order; and towards the end of dinner (which in the greatest feasts with them lasteth never above an hour and an half) there is an hymn sung, varied according to the invention of him that composeth it, (for they have excellent poesy,) but the subject of it is (always) the praises of Adam and Noah and Abraham; whereof the former two peopled the world, and the last was the Father of the Faithful: concluding ever with a thanksgiving for the nativity of our Saviour, in whose birth the births of all are only blessed. Dinner being done, the Tirsan retireth again; and having withdrawn himself alone into a place where he maketh some private prayers, he cometh forth the third time, to give the blessing; with all his descendants, who stand about him as at the first. Then he calleth them forth by one and by one, by name, as he pleaseth, though seldom the order of age be inverted. The person that is called (the table being before removed) kneeleth down before the chair, and the father layeth his hand upon his head, or her head, and giveth the blessing in these words: *Son of Bensalem, (or Daughter of Bensalem,) thy father saith it; the man by whom thou hast breath and life speaketh the word; The blessing of the everlasting Father, the Prince of Peace, and the Holy Dove be upon thee, and make the days of thy pilgrimage good and many.* This he saith to every of them; and that done, if there be any of his sons of eminent merit and virtue, (so they be not above two,) he calleth for them again;

and saith, laying his arm over their shoulders, they standing; *Sons, it is well ye are born, give God the praise, and persevere to the end.* And withal delivereth to either of them a jewel, made in the figure of an ear of wheat, which they ever after wear in the front of their turban or hat. This done, they fall to music and dances, and other recreations, after their manner, for the rest of the day. This is the full order of that feast.

By that time six or seven days were spent, I was fallen into strait acquaintance with a merchant of that city, whose name was Joabin. He was a Jew, and circumcised: for they have some few stirps of Jews yet remaining among them, whom they leave to their own religion. Which they may the better do, because they are of a far differing disposition from the Jews in other parts. For whereas they hate the name of Christ, and have a secret inbred rancour against the people amongst whom they live: these (contrariwise) give unto our Saviour many high attributes, and love the nation of Bensalem extremely. Surely this man of whom I speak would ever acknowledge that Christ was born of a Virgin, and that he was more than a man; and he would tell how God made him ruler of the Seraphims which guard his throne; and they call him also the *Milken Way*, and the *Eliah* of the *Messiah;* and many other high names; which though they be inferior to his divine Majesty, yet they are far from the language of other Jews. And for the country of Bensalem, this man would make no end of commending it: being desirous, by tradition among the Jews there, to have it believed that the people thereof were of the generations of Abraham, by another son, whom they call Nachoran; and that Moses by a secret cabala ordained the laws of Bensalem which they now use; and that when the Messiah should come, and sit in his throne at Hierusalem, the king of Bensalem should sit at his feet, whereas other kings should keep a great distance. But yet setting aside these Jewish dreams, the man was a wise man, and learned, and of great policy, and excellently seen in the laws and customs of that nation. Amongst other discourses, one day I told him I was much affected with the relation I had from some of the company, of their custom in holding the Feast of the Family; for that (methought) I had never heard of a solemnity wherein nature did so much preside. And because propagation of families

proceedeth from the nuptial copulation, I desired to know of him what laws and customs they had concerning marriage; and whether they kept marriage well; and whether they were tied to one wife? For that where population is so much affected, and such as with them it seemed to be, there is commonly permission of plurality of wives. To this he said, "You have reason for to commend that excellent institution of the Feast of the Family. And indeed we have experience, that those families that are partakers of the blessing of that feast do flourish and prosper ever after in an extraordinary manner. But hear me now, and I will tell you what I know. You shall understand that there is not under the heavens so chaste a nation as this of Bensalem; nor so free from all pollution or foulness. It is the virgin of the world. I remember I have read in one of your European books, of an holy hermit amongst you that desired to see the Spirit of Fornication; and there appeared to him a little foul ugly Æthiop.[1] But if he had desired to see the Spirit of Chastity of Bensalem, it would have appeared to him in the likeness of a fair beautiful Cherubin. For there is nothing amongst mortal men more fair and admirable, than the chaste minds of this people. Know therefore, that with them there are no stews, no dissolute houses, no courtesans, nor any thing of that kind. Nay they wonder (with detestation) at you in Europe, which permit such things. They say ye have put marriage out of office: for marriage is ordained a remedy for unlawful concupiscence; and natural concupiscence seemeth as a spur to marriage. But when men have at hand a remedy more agreeable to their corrupt will, marriage is almost expulsed. And therefore there are with you seen infinite men that marry not, but chuse rather a libertine and impure single life, than to be yoked in marriage; and many that do marry, marry late, when the prime and strength of their years is past. And when they do marry, what is marriage to them but a very bargain; wherein is sought alliance, or portion, or reputation, with some desire (almost indifferent) of issue; and not the faithful nuptial union of man and wife, that was first instituted. Neither is it possible that those that have cast away so basely so much of their strength, should greatly esteem children, (being of

[1] The Klein Meister of La Motte Fouqué's *Sintram.*—*R. L. E.*

the same matter [1],) as chaste men do. So likewise during marriage, is the case much amended, as it ought to be if those things were tolerated only for necessity? No, but they remain still as a very affront to marriage. The haunting of those dissolute places, or resort to courtesans, are no more punished in married men than in bachelors. And the depraved custom of change, and the delight in meretricious embracements, (where sin is turned into art,) [2] maketh marriage a dull thing, and a kind of imposition or tax. They hear you defend these things, as done to avoid greater evils; as advoutries, deflouring of virgins, unnatural lust, and the like. But they say this is a preposterous wisdom; and they call it *Lot's offer*, who to save his guests from abusing, offered his daughters: nay they say farther that there is little gained in this; for that the same vices and appetites do still remain and abound; unlawful lust being like a furnace, that if you stop the flames altogether, it will quench; but if you give it any vent, it will rage. As for masculine love, they have no touch of it [3]; and yet there are not so faithful and inviolate friendships in the world again as are there; and to speak generally, (as I said before,) I have not read of any such chastity in any people as theirs. And their usual saying is, *That whosoever is unchaste cannot reverence himself;* and they say, *That the reverence of a man's self is, next religion, the chiefest bridle of all vices.*" And when he had said this, the good Jew paused a little; whereupon I, far more willing to hear him speak on than to speak myself, yet thinking it decent that upon his pause of speech I should not be altogether silent, said only this; "That I would say to him, as the widow of Sarepta said to Elias; that he was come to bring to memory our sins; and that I confess the righteousness of Bensalem was greater than the righteousness of Europe." At which speech he bowed his head, and went on in this manner: "They have also many wise and excellent laws touching marriage. They allow no polygamy. They have ordained that none do intermarry or contract, until a month be passed from their first interview. Marriage without consent of parents they do not make void, but they mulct

[1] *liberi* (*pars nostri altera*).

[2] Non v' era giunto ancor Sardanapalo
A mostrar cio ch' in camera si puote.
DANTE, *Paradiso*, xiv.—*R. L. E.*

[3] *istos ne fando quidem norunt.*

it in the inheritors: for the children of such marriages are not admitted to inherit above a third part of their parents' inheritance. I have read in a book of one of your men, of a Feigned Commonwealth, where the married couple are permitted, before they contract, to see one another naked.[1] This they dislike; for they think it a scorn to give a refusal after so familiar knowledge: but because of many hidden defects in men and women's bodies[2], they have a more civil way; for they have near every town a couple of pools, (which they call *Adam and Eve's pools*,) where it is permitted to one of the friends of the man, and another of the friends of the woman, to see them severally bathe naked."

And as we were thus in conference, there came one that seemed to be a messenger, in a rich huke[3], that spake with the Jew: whereupon he turned to me and said; "You will pardon me, for I am commanded away in haste." The next morning he came to me again, joyful as it seemed, and said, "There is word come to the governor of the city, that one of the Fathers of Salomon's House will be here this day seven-night: we have seen none of them this dozen years. His coming is in state; but the cause of his coming is secret. I will provide you and your fellows of a good standing to see his entry." I thanked him, and told him, "I was most glad of the news." The day being come, he made his entry. He was a man of middle stature and age, comely of person, and had an aspect as if he pitied men. He was clothed in a robe of fine black cloth, with wide sleeves and a cape. His under garment was of excellent white linen down to the foot, girt with a girdle of the same; and a sindon or tippet of the same about his neck. He had gloves that were curious, and set with stone; and shoes of peach-coloured velvet. His neck was bare to the shoulders. His hat was like a helmet, or Spanish Montera; and his locks curled below it decently: they were of colour brown. His beard was cut round, and of the same colour with his hair, somewhat lighter.[4] He was carried in a rich chariot without wheels, litter-wise; with two horses at either end, richly trapped in blue velvet embroidered; and two footmen on each side in the like attire. The chariot was all of cedar, gilt, and adorned with

[1] See More's Utopia, book ii. — *R. L. E.*

[2] The translation adds *qui matrimonium postea infelix reddere possint.*

[3] *indutus tunicâ pictâ et inauratâ.*

[4] The words "somewhat lighter" are omitted in the translation.

crystal; save that the fore-end had pannels of sapphires, set in borders of gold, and the hinder-end the like of emeralds [1] of the Peru colour. There was also a sun of gold, radiant, upon the top, in the midst [2]; and on the top before, a small cherub of gold, with wings displayed. The chariot was covered with cloth of gold tissued upon blue. He had before him fifty attendants, young men all, in white sattin loose coats to the mid-leg; and stockings of white silk; and shoes of blue velvet; and hats of blue velvet; with fine plumes of divers colours, set round like hat-bands. Next before the chariot went two men, bare-headed, in linen garments down to the foot, girt, and shoes of blue velvet; who carried the one a crosier, the other a pastoral staff like a sheep-hook; neither of them of metal, but the crosier of balm-wood, the pastoral staff of cedar. Horsemen he had none, neither before nor behind his chariot: as it seemeth, to avoid all tumult and trouble. Behind his chariot went all the officers and principals of the Companies of the City. He sat alone, upon cushions of a kind of excellent plush, blue; and under his foot curious carpets of silk of divers colours, like the Persian, but far finer. He held up his bare hand as he went, as blessing the people, but in silence. The street was wonderfully well kept [3]: so that there was never any army had their men stand in better battle-array, than the people stood. The windows likewise were not crowded, but every one stood in them as if they had been placed. When the shew was past, the Jew said to me; "I shall not be able to attend you [4] as I would, in regard of some charge the city hath laid upon me, for the entertaining of this great person." Three days after, the Jew came to me again, and said; "Ye are happy men; for the Father of Salomon's House taketh knowledge of your being here, and commanded me to tell you that he will admit all your company to his presence, and have private conference with one of you that ye shall choose: and for this hath appointed the next day after to-morrow. And because he meaneth to give you his blessing, he hath appointed it in the forenoon." We came at our day and hour, and I was chosen by my fellows for the private access. We found him in a fair chamber, richly hanged,

[1] *emerauds* in orig.

[2] *Etiam in medio verticis cathedræ, sol erat, ex auro radians.* The English in the original has a comma after "gold," and no stop after "radiant;" a misprint probably.

[3] *Plateæ ita erant ordinatæ ut via ampla pateret, nullibi interclusa.*

[4] *Per aliquot jam dies detinebor, quò minus, &c.*

and carpeted under foot, without any degrees to the state. He was set upon a low throne richly adorned, and a rich cloth of state over his head, of blue satin embroidered. He was alone, save that he had two pages of honour, on either hand one, finely attired in white. His under-garments were the like that we saw him wear in the chariot; but instead of his gown, he had on him a mantle with a cape, of the same fine black, fastened about him. When we came in, as we were taught, we bowed low at our first entrance; and when we were come near his chair, he stood up, holding forth his hand ungloved, and in posture of blessing; and we every one of us stooped down, and kissed the hem of his tippet. That done, the rest departed, and I remained. Then he warned the pages forth of the room, and caused me to sit down beside him, and spake to me thus in the Spanish tongue:

"God bless thee, my son; I will give thee the greatest jewel I have. For I will impart unto thee, for the love of God and men, a relation of the true state of Salomon's House. Son, to make you know the true state of Salomon's House, I will keep this order. First, I will set forth unto you the end of our foundation. Secondly, the preparations and instruments we have for our works. Thirdly, the several employments and functions whereto our fellows are assigned. And fourthly, the ordinances and rites which we observe.

"The End of our Foundation is the knowledge of Causes, and secret motions of things[1]; and the enlarging of the bounds of Human Empire, to the effecting of all things possible.

"The Preparations and Instruments are these. We have large and deep caves of several depths: the deepest are sunk six hundred fathom; and some of them are digged and made under great hills and mountains: so that if you reckon together the depth of the hill and the depth of the cave, they are (some of them) above three miles deep. For we find that the depth of a hill, and the depth of a cave from the flat, is the same thing; both remote alike from the sun and heaven's beams, and from the open air. These caves we call the Lower Region. And we use them for all coagulations, indurations, refrigerations, and conservations of bodies. We use them like-

[1] *et motuum, ac virtutum interiorum in Natura.*

wise for the imitation of natural mines; and the producing also of new artificial metals, by compositions and materials which we use[1], and lay there for many years. We use them also sometimes, (which may seem strange,) for curing of some diseases, and for prolongation of life in some hermits that choose to live there, well accommodated of all things necessary; and indeed live very long; by whom also we learn many things.

"We have burials in several earths[2], where we put divers cements, as the Chineses do their porcellain. But we have them in greater variety, and some of them more fine. We have also great variety of composts, and soils[3], for the making of the earth fruitful.

"We have high towers; the highest about half a mile in height; and some of them likewise set upon high mountains; so that the vantage of the hill with the tower is in the highest of them three miles at least. And these places we call the Upper Region: accounting the air between the high places and the low, as a Middle Region. We use these towers, according to their several heights and situations, for insolation, refrigeration, conservation; and for the view of divers meteors; as winds, rain, snow, hail; and some of the fiery meteors also. And upon them, in some places, are dwellings of hermits, whom we visit sometimes, and instruct what to observe.

"We have great lakes both salt and fresh, whereof we have use for the fish and fowl.[4] We use them also for burials of some natural bodies: for we find a difference in things buried in earth or in air below the earth, and things buried in water. We have also pools, of which some do strain fresh water out of salt; and others by art do turn fresh water into salt. We have also some rocks in the midst of the sea, and some bays[5] upon the shore, for some works wherein is required the air and vapour of the sea. We have likewise violent streams and cataracts, which serve us for many motions[6]: and likewise engines for multiplying and enforcing of winds, to set also on going divers motions.[7]

"We have also a number of artificial wells and fountains,

[1] *quæ ibi præparamus.*

[2] *Habemus etiam alias sepulturas corporum naturalium et materiarum; non in concavo aliquo, sed in ipsa terrâ contiguâ, ubi complura cæmenta condimus, &c.*

[3] *stercorationum et fimorum varietatem magnam, item congestionum et massarum aliarum, &c.*

[4] *aves item palustres et aquaticas, omnis generis.*

[5] *loca quædam aprica.*

[6] *motuum violentorum.*

[7] *quæ ventos excipiant, multiplicent, et roborent.*

made in imitation of the natural sources and baths; as tincted upon vitriol, sulphur, steel, brass, lead, nitre, and other minerals. And again we have little wells for infusions of many things, where the waters take the virtue[1] quicker and better than in vessels or basons. And amongst them we have a water which we call Water of Paradise, being, by that we do to it, made very sovereign for health, and prolongation of life.

"We have also great and spacious houses, where we imitate and demonstrate[2] meteors; as snow, hail, rain, some artificial rains of bodies and not of water, thunders, lightnings[3]; also generations of bodies in air; as frogs, flies, and divers others.

"We have also certain chambers, which we call Chambers of Health, where we qualify the air as we think good and proper for the cure of divers diseases, and preservation of health.[4]

"We have also fair and large baths, of several mixtures, for the cure of diseases, and the restoring of man's body from arefaction: and others for the confirming of it in strength of sinews, vital parts, and the very juice and substance of the body.

"We have also large and various orchards and gardens, wherein we do not so much respect beauty, as variety of ground and soil, proper for divers trees and herbs: and some very spacious, where trees and berries are set whereof we make divers kinds of drinks, besides the vineyards. In these we practise likewise all conclusions of grafting and inoculating, as well of wild-trees as fruit-trees, which produceth many effects. And we make (by art) in the same orchards and gardens, trees and flowers to come earlier or later than their seasons; and to come up and bear more speedily than by their natural course they do. We make them also by art greater much than their nature; and their fruit greater and sweeter and of differing taste, smell, colour, and figure, from their nature. And many of them we so order, as they become of medicinal use.

"We have also means to make divers plants rise by mixtures of earths without seeds; and likewise to make divers new

[1] *ubi aqua (currens scilicet) virtutem corporum melius et vivacius, &c.*

[2] i. e. exhibit: *in quibus imitamenta et repræsentationes meteororum exhibemus.*

[3] The translation adds *coruscationum.*

[4] This experiment has been tried, especially by Dr. Beddoes of Clifton, but without any marked result. Some relief has been obtained in cases of phthisis by inhaling oxygenated air. — *R. L. E.*

plants, differing from the vulgar; and to make one tree or plant turn into another.

"We have also parks and inclosures of all sorts of beasts and birds, which we use not only for view or rareness, but likewise for dissections and trials; that thereby we may take light what may be wrought upon the body of man. Wherein we find many strange effects; as continuing life in them, though divers parts, which you account vital, be perished and taken forth; resuscitating of some that seem dead in appearance; and the like. We try also all poisons and other medicines upon them, as well of chirurgery as physic.[1] By art likewise, we make them greater or taller than their kind is; and contrariwise dwarf them, and stay their growth: we make them more fruitful and bearing than their kind is; and contrariwise barren and not generative. Also we make them differ in colour, shape, activity, many ways. We find means to make commixtures and copulations of different kinds; which have produced many new kinds, and them not barren, as the general opinion is. We make a number of kinds of serpents, worms, flies, fishes, of putrefaction; whereof some are advanced (in effect) to be perfect creatures, like beasts or birds; and have sexes, and do propagate. Neither do we this by chance, but we know beforehand of what matter and commixture what kind of those creatures will arise.[2]

"We have also particular pools, where we make trials upon fishes, as we have said before of beasts and birds.

"We have also places for breed and generation of those kinds of worms and flies which are of special use; such as are with you your silk-worms and bees.

"I will not hold you long with recounting of our brew-houses, bake-houses, and kitchens, where are made divers drinks, breads, and meats, rare and of special effects. Wines we have of grapes; and drinks of other juice of fruits, of grains, and of roots[3]: and of mixtures with honey, sugar, manna, and fruits dried and decocted. Also of the tears or

[1] The translation adds *ut corpori humano melius caveamus.*

[2] This passage is quoted with great approbation by Geoffroi St. Hilaire at the end of a memoir on the results of artificial incubation read before the Academy of Sciences in 1826, and published in the *Annales du Museum* for that year. It may be said that he was the first by whom the scientific importance of monstrosities was fully appreciated, and in answer to the objections which were made to the study of Teratology on the ground of its inutility, he invokes the authority of Bacon. — *R. L. E.*

[3] *decoctionibus granorum et radicum.*

woundings of trees, and of the pulp of canes. And these drinks are of several ages, some to the age or last of forty years. We have drinks also brewed with several herbs, and roots, and spices; yea with several fleshes, and white meats[1]; whereof some of the drinks are such, as they are in effect meat and drink both[2]: so that divers, especially in age, do desire to live with them, with little or no meat or bread. And above all, we strive to have drinks of extreme thin parts, to insinuate into the body, and yet without all biting, sharpness, or fretting; insomuch as some of them put upon the back of your hand will, with a little stay, pass through to the palm, and yet taste mild to the mouth. We have also waters which we ripen in that fashion, as they become nourishing; so that they are indeed excellent drink; and many will use no other. Breads we have of several grains, roots, and kernels: yea and some of flesh and fish dried; with divers kinds of leavenings and seasonings: so that some do extremely move appetites; some do nourish so, as divers do live of them, without any other meat; who live very long. So for meats, we have some of them so beaten and made tender and mortified, yet without all corrupting, as a weak heat of the stomach will turn them into good chylus, as well as a strong heat would meat otherwise prepared. We have some meats also and breads and drinks, which taken by men enable them to fast long after; and some other, that used make the very flesh of men's bodies sensibly more hard and tough, and their strength far greater than otherwise it would be.

"We have dispensatories, or shops of medicines. Wherein you may easily think, if we have such variety of plants and living creatures more than you have in Europe, (for we know what you have,) the simples, drugs, and ingredients of medicines, must likewise be in so much the greater variety. We have them likewise of divers ages, and long fermentations. And for their preparations[3], we have not only all manner of exquisite distillations and separations, and especially by gentle heats and percolations through divers strainers, yea and substances[4]; but

[1] *quin et additis quandoque carnibus, ovis, lacticiniis, et aliis esculentis.*

[2] Chocolate, which however was well known in Bacon's time, seems to fulfil this description. It long since gave rise to a doubt whether drinking it amounted to breaking fast. See the treatise of the Jesuit Hurtado, "Utrum potio chocolatica frangat jejunium Ecclesiæ." — *R. L. E.*

[3] *medicinarum præparationes.*

[4] *per diversa lintea, lanea, ligna, imò et substantias solidiores.*

also exact forms of composition, whereby they incorporate almost, as they were natural simples.

"We have also divers mechanical arts, which you have not; and stuffs made by them; as papers, linen, silks, tissues; dainty works of feathers of wonderful lustre; excellent dyes, and many others; and shops likewise [1], as well for such as are not brought into vulgar use amongst us as for those that are. For you must know that of the things before recited, many of them are grown into use throughout the kingdom; but yet if they did flow from our invention, we have of them also for patterns and principals.[2]

"We have also furnaces of great diversities, and that keep great diversity of heats; fierce and quick; strong and constant; soft and mild; blown, quiet; dry, moist; and the like. But above all, we have heats in imitation of the sun's and heavenly bodies' heats, that pass divers inequalities and (as it were) orbs, progresses, and returns, whereby we produce admirable effects. Besides, we have heats [3] of dungs, and of bellies and maws of living creatures, and of their bloods and bodies; and of hays and herbs laid up moist; of lime unquenched; and such like. Instruments also which generate heat only by motion.[4] And farther, places for strong insolations; and again, places under the earth, which by nature or art yield heat. These divers heats we use, as the nature of the operation which we intend requireth.

"We have also perspective-houses, where we make demonstrations of all lights and radiations; and of all colours; and out of things uncoloured and transparent, we can represent unto you all several colours; not in rain-bows [5], as it is in gems and prisms, but of themselves single.[6] We represent also all multiplications of light, which we carry to great distance, and make so sharp as to discern small points and lines; also all colorations of light: all delusions and deceits of the sight, in figures, magnitudes, motions, colours: all demonstrations of shadows.[7] We find also divers means, yet unknown to you,

[1] *officinas etiam aliquarum artium prædictarum.*

[2] *eorum quandoque exemplaria, tanquam primigenia, et optimè elaborata, in Domo nostrâ retinemus.*

[3] *imitationes caloris.*

[4] Bacon seems to refer to the result of his investigation into the form of heat, namely that heat is a kind of motion. — *R. L. E.*

[5] *non in formâ iridum gliscentes.*

[6] *sed per se simplices et constantes.*

[7] *umbrarum et imaginum in aëre volitantium.*

of producing of light originally from divers bodies. We procure means of seeing objects afar off; as in the heaven and remote places; and represent things near as afar off, and things afar off as near; making feigned distances. We have also helps for the sight, far above spectacles and glasses in use.[1] We have also glasses and means[2] to see small and minute bodies perfectly and distinctly; as the shapes and colours of small flies and worms, grains and flaws in gems, which cannot otherwise be seen; observations in urine[3] and blood, not otherwise to be seen.[4] We make artificial rain-bows, halos, and circles about light.[5] We represent also all manner of reflexions, refractions, and multiplications of visual beams of objects.

"We have also precious stones of all kinds, many of them of great beauty, and to you unknown; crystals likewise; and glasses of divers kinds; and amongst them some of metals vitrificated, and other materials besides those of which you make glass. Also a number of fossils, and imperfect minerals, which you have not. Likewise loadstones of prodigious virtue; and other rare stones, both natural and artificial.

"We have also sound-houses, where we practise and demonstrate all sounds, and their generation. We have harmonies which you have not, of quarter-sounds, and lesser slides of sounds.[6] Divers instruments of music likewise to you unknown, some sweeter than any you have; together with bells and rings that are dainty and sweet. We represent small sounds as great and deep; likewise great sounds extenuate and sharp; we make divers tremblings and warblings of sounds, which in their original are entire. We represent and imitate all articulate sounds and letters, and the voices and notes of beasts and birds. We have certain helps which set to the ear do further the hearing greatly. We have also divers strange and artificial

[1] *quæ bisoculis vestris et speculis, usu longe præstant.* [2] *artificia.*

[3] It has been proposed to facilitate the examination of diabetic urine by an apparatus in which the amount of sugar present in it is to be measured by its effect on the plane of polarisation of polarised light transmitted through it.—*R. L. E.*

[4] Nothing that has been accomplished with the microscope would have interested Bacon more than the discoveries of Schleiden and Schwann, because nothing has brought us so near the latens processus by which the tissues of organic life are formed. It is remarkable that when Schleiden had as he conceived destroyed the analogy between the developments of vegetable and animal life, by showing that all vegetable tissues are developed by cells, Schwann should have re-established it more clearly than before by showing that this is true of all animal tissues also.—*R. L. E.*

[5] *halones, circulos, vibrationes et trepidationes luminis.*

[6] *miscentes non tantum* Beta *illud acutum et molle, ut vos, sed* quadrantes *sonorum; et sonos tremulos aliquos dulcissimos.*

echos, reflecting the voice many times, and as it were tossing it: and some that give back the voice louder than it came; some shriller, and some deeper; yea, some rendering the voice differing in the letters or articulate sound from that they receive. We have also means to convey sounds in trunks and pipes, in strange lines and distances.[1]

"We have also perfume-houses; wherewith we join also practices of taste. We multiply smells, which may seem strange. We imitate smells, making all smells to breathe out of other mixtures than those that give them.[2] We make divers imitations of taste likewise, so that they will deceive any man's taste. And in this house we contain also a confiture-house; where we make all sweet-meats, dry and moist[3], and divers pleasant wines, milks, broths, and sallets, far in greater variety than you have.

"We have also engine-houses, where are prepared engines and instruments for all sorts of motions. There we imitate and practise to make swifter motions than any you have, either out of your muskets or any engine that you have; and to make them and multiply them more easily, and with small force[4], by wheels and other means: and to make them stronger, and more violent than yours are; exceeding your greatest cannons and basilisks. We represent also ordnance and instruments of war, and engines of all kinds: and likewise new mixtures and compositions of gun-powder, wildfires burning in water, and unquenchable. Also fire-works of all variety both for pleasure and use. We imitate also flights of birds; we have some degrees of flying in the air[5]; we have ships and boats for going under water[6], and brooking of seas; also swimming-girdles and

[1] [*ad magnam distantiam, et in lineis tortuosis.*] This is now done very effectively by means of gutta percha tubing. — *R. L. E.*

[2] This power of imitating smells is one of the recent achievements of chemistry. From fusil oil, a product of the distillation of spirits from potatoes, itself exceedingly offensive, may be got oil of apples, oil of pears, oil of grapes, and oil of cognac. The oil of pine-apples and that of bitter almonds enable confectioners to imitate perfectly the scent and flavour of pine-apples and bitter almonds respectively, and both, like the perfumes already mentioned, are got from very offensive substances. — *R. L. E.*

[3] The translation adds *imò et condimus ea cum rebus aliis dulcibus, gratissimis, præter saccharum et mel.*

[4] *motus reddere faciliores et intentiores, eos multiplicando per rotas et alios modos.*

[5] *gradus quosdam habemus et commoditates vecturæ per aërem instar animalium alatorum.*

[6] A boat for going under water was one of Drebbel's inventions exhibited in 1620. Bacon in the *De Augmentis* refers to another namely, Drebbel's method of producing cold. — *R. L. E.*

supporters. We have divers curious clocks, and other like motions of return[1], and some perpetual motions. We imitate also motions of living creatures, by images of men, beasts, birds, fishes, and serpents. We have also a great number of other various[2] motions, strange for equality, fineness, and subtilty.

"We have also a mathematical house, where are represented all instruments, as well of geometry as astronomy, exquisitely made.

"We have also houses of deceits of the senses; where we represent all manner of feats of juggling, false apparitions, impostures, and illusions; and their fallacies. And surely you will easily believe that we that have so many things truly natural which induce admiration, could in a world of particulars deceive the senses, if we would disguise those things and labour to make them seem more miraculous. But we do hate all impostures and lies: insomuch as we have severely forbidden it to all our fellows, under pain of ignominy and fines, that they do not shew any natural work or thing, adorned or swelling[3]; but only pure as it is, and without all affectation of strangeness.

"These are (my son) the riches of Salomon's House.

"For the several employments and offices of our fellows; we have twelve that sail into foreign countries, under the names of other nations, (for our own we conceal;) who bring us the books, and abstracts, and patterns of experiments of all other parts.[4] These we call Merchants of Light.

"We have three that collect the experiments which are in all books. These we call Depredators.

"We have three that collect the experiments of all mechanical arts; and also of liberal sciences; and also of practices which are not brought into arts. These we call Mystery-men.[5]

"We have three that try new experiments, such as themselves think good. These we call Pioners or Miners.

"We have three that draw the experiments of the former four into titles and tables, to give the better light for the

[1] *et alios motus aëris et aquarum, in orbem et per vices revertentes.*

[2] The word "various," which seems to be redundant, is omitted in the translation.

[3] *artificioso apparatu ementitum.*

[4] *qui libros, et materias et exemplaria experimentorum ad nos perferunt.*

[5] In the translation they are called *Venatores*, hunters; a name, however, which does not seem to distinguish their peculiar office so accurately as "mystery-men," that is, men whose business was to inquire after mysteries, *i. e.* crafts.

drawing of observations and axioms out of them. These we call Compilers.[1]

"We have three that bend themselves, looking into the experiments of their fellows, and cast about how to draw out of them things of use and practice for man's life, and knowledge[2] as well for works as for plain demonstration of causes, means of natural divinations, and the easy and clear discovery of the virtues and parts of bodies.[3] These we call Dowry-men or Benefactors.[4]

"Then after divers meetings and consults of our whole number, to consider of the former labours and collections[5], we have three that take care, out of them, to direct new experiments, of a higher light, more penetrating into nature than the former. These we call Lamps.

"We have three others that do execute the experiments so directed, and report them. These we call Inoculators.

"Lastly, we have three that raise the former discoveries by experiments into greater observations, axioms, and aphorisms.[6] These we call Interpreters of Nature.

"We have also, as you must think, novices and apprentices, that the succession of the former employed men do not fail; besides a great number of servants and attendants, men and women. And this we do also: we have consultations, which of the inventions and experiences which we have discovered shall be published, and which not: and take all an oath of secrecy, for the concealing of those which we think fit to keep secret: though some of those we do reveal sometimes to the state, and some not.[7]

"For our ordinances and rites: we have two very long and fair galleries: in one of these we place patterns and samples of all manner of the more rare and excellent inventions: in the other we place the statua's of all principal inventors. There we have the statua of your Columbus, that discovered

[1] These represent the formation of the tables comparentiæ, absentiæ in proximo, and graduum. See *Novum Organum*, ii. § 11—13. — *R. L. E.*
For "compilers," the translation has *divisores*, distributors.

[2] *necnon quæ inserviant scientiis, non solùm quoad opera, sed, &c.*

[3] *quæ sint in corporibus singulis partes latentes, quæ virtutes.*

[4] These represent the Vindemiatio prima. See *Nov. Org.* ii. § 20. — *R. L. E.*

[5] *qui labores et collectiones priores penitus introspiciunt et quasi ruminantur.*

[6] The translation adds that this was only done after consultation with the whole body. *Quod faciunt non nisi consultatione et colloquis prius habitis cum sociis universis.*

[7] *Etsi nonnulla ex iis, cum consensu, interdum Regi aut Senatui revelemus: alia autem omnino intra notitiam nostram cohibemus.*

the West Indies: also the inventor of ships: your monk that was the inventor of ordnance and of gunpowder: the inventor of music: the inventor of letters: the inventor of printing: the inventor of observations of astronomy: the inventor of works in metal: the inventor of glass: the inventor of silk of the worm: the inventor of wine: the inventor of corn and bread: the inventor of sugars: and all these by more certain tradition than you have. Then have we divers inventors of our own, of excellent works; which since you have not seen, it were too long to make descriptions of them; and besides, in the right understanding of those descriptions you might easily err. For upon every invention of value, we erect a statua to the inventor, and give him a liberal and honourable reward. These statua's are some of brass; some of marble and touch-stone; some of cedar and other special woods gilt and adorned: some of iron; some of silver; some of gold.

"We have certain hymns and services, which we say daily, of laud and thanks to God for his marvellous works: and forms of prayers, imploring his aid and blessing for the illumination of our labours, and the turning of them into good and holy uses.

"Lastly, we have circuits or visits of divers principal cities of the kingdom; where, as it cometh to pass, we do publish such new profitable inventions as we think good. And we do also declare natural divinations[1] of diseases, plagues, swarms of hurtful creatures, scarcity, tempests, earthquakes, great inundations, comets, temperature of the year, and divers other things; and we give counsel thereupon what the people shall do for the prevention and remedy of them."

And when he had said this, he stood up; and I, as I had been taught, kneeled down; and he laid his right hand upon my head, and said; "God bless thee, my son, and God bless this relation which I have made. I give thee leave to publish it for the good of other nations; for we here are in God's bosom, a land unknown." And so he left me; having assigned a value of about two thousand ducats, for a bounty to me and my fellows. For they give great largesses where they come upon all occasions.

[1] *Prædicimus etiam antequam adveniant (id quod ad Naturales Divinationes pertinet) morbos epidemicos, &c.*

[THE REST WAS NOT PERFECTED.]

MAGNALIA NATURÆ,

PRÆCIPUE QUOAD USUS HUMANOS.*

The prolongation of life.

The restitution of youth in some degree.

The retardation of age.

The curing of diseases counted incurable.

The mitigation of pain.

More easy and less loathsome purgings.

The increasing of strength and activity.

The increasing of ability to suffer torture or pain.

The altering of complexions, and fatness and leanness.

The altering of statures.

The altering of features.

The increasing and exalting of the intellectual parts.

Versions of bodies into other bodies.

Making of new species.

Transplanting of one species into another.

Instruments of destruction, as of war and poison.

Exhilaration of the spirits, and putting them in good disposition.

Force of the imagination, either upon another body, or upon the body itself.

Acceleration of time in maturations.

Acceleration of time in clarifications.

* This paper follows the *New Atlantis* in the original edition, and concludes the volume.

Acceleration of putrefaction.

Acceleration of decoction.

Acceleration of germination.

Making rich composts for the earth.

Impressions of the air, and raising of tempests.

Great alteration; as in induration, emollition, &c.

Turning crude and watry substances into oily and unctuous substances.

Drawing of new foods out of substances not now in use.

Making new threads for apparel; and new stuffs; such as paper, glass, &c.

Natural divinations.

Deceptions of the senses.

Greater pleasures of the senses.

Artificial minerals and cements.

PHILOSOPHICAL WORKS.

PART III.

WORKS ORIGINALLY DESIGNED FOR PARTS OF THE INSTAURATIO MAGNA, BUT SUPERSEDED OR ABANDONED;

ARRANGED

ACCORDING TO THE ORDER IN WHICH THEY WERE WRITTEN.

"Because you were wont to make me believe you took liking to my writings, I send you some of this vacation's fruits; and thus much more of my mind and purpose. I hasten not to publish: perishing I would prevent; and am forced to respect as well my times as the matter. For with me it is thus, and I think with all men in my case: if I bind myself to an argument, it loadeth my mind, but if I rid myself of the present cogitation, it is rather a recreation. This hath put me into these miscellanies, which I purpose to suppress if God give me leave to write a just and perfect volume of Philosophy, which I go on with, though slowly." — *Letter to Bishop Andrews upon sending him the "Cogitata et Visa."*

PREFACE.

We have now collected all of Bacon's philosophical works which there is reason to believe he would himself have cared to preserve. The rest contain but little matter of which the substance may not be found in one part or another of the preceding volumes, reduced to the shape in which he thought it would be most effective. In his eyes, those which follow belonged to the part of the race which was past and was not to be looked back upon; for the end which he was pursuing lay still far before him, and his great anxiety was to bequeath the pursuit to a second generation, which should start fresh from the point where he was obliged to leave it.

It is not so however with us. In our eyes the interest which attaches to his labours is of a different kind. We no longer look for the discovery of any great treasure by following in that direction. His peculiar system of philosophy,—that is to say, the peculiar method of investigation, the "organum," the "formula," the "clavis," the "ars ipsa interpretandi naturam," the "filum Labyrinthi," or by whichever of its many names we choose to call that artificial process by which alone he believed that man could attain a knowledge of the laws and a command over the powers of nature,—of this philosophy we can make nothing. If we have not tried it, it is because we feel confident that it would not answer. We regard it as a curious piece of machinery, very subtle, elaborate, and ingenious, but not worth constructing, because all the work it could do may be done more easily another way. But though this, the favourite child of Bacon's genius which he would fain have made heir of all he had, died thus in the cradle, his genius itself still lives and works among us; whatever brings us into nearer communion with that is still interesting, and it is as a product and exponent of Bacon's own mind and character that the Baconian philosophy, properly so called, retains its chief value for modern men.

Viewed in this light, the superseded or abandoned pieces which are here gathered together under this third head are among the most interesting of the whole collection. For in them we may trace more than can be traced elsewhere of what may be called the *personal* history of his great philosophical scheme, — the practical enterprise in which it engaged him, and its effect on his inner and outer life. We cannot indeed trace the Idea back to its great dawn: to the days when, in the fearless confidence of four and twenty, he wrote TEMPORIS PARTUS MAXIMUS at the head of the manuscript in which it was first set forth, — thinking no doubt in his inexperience that Truth had only to show her face in order to prevail. Our records do not go so far back as that: and before the period at which they begin a shadow had fallen across the prospect. The presumptuous "maximus" has been silently withdrawn and "masculus" put in its place. Instead of that overconfidence in the sympathy of his generation we find what looks like an over-apprehension of hostility. And it is in deprecating general objections; in answering, mollifying, conciliating, or contriving to pass by prejudices; in devising prefaces, apologies, modes of putting his case and selecting his audience so as to obtain a dispassionate hearing for it; that we find him, if not chiefly, yet much and anxiously employed.

It is probably to the experiences and discouragements of this part of his career that we owe the greater part of the first book of the *Novum Organum*, which embodies all the defensive measures into which they drove him; but though the result may be seen there, the history may be better traced in these fragments. It is in them that we can best see how early this idea of recovering to Man the mastery over Nature presented itself to him; presented itself not as a vague speculation or poetic dream, but as an object to be attempted; the highest at which a man could aim, yet not too high for man to aim at; — how certain he felt that it might be accomplished if men would but make the trial fairly; how clearly he saw or thought he saw the way to set about it; how vast his expectations of the good to come; how unshakable his confidence in the means to be used; what immense intellectual operations that confidence gave him courage to enter upon and patience to proceed with, — deliberately, alone, year after year, and decade after decade, still hoping for success in

the end, — delays, distractions, disappointments, discouragements internal and external, notwithstanding. They serve moreover to remind us of another fact which it is not unimportant to remember, and which, judging from the events of later times, we are too apt to overlook or forget, — namely, how little *authority* in matters of this kind his name carried with it in those days. "A fool could not have written it, and a wise man would not," is said to have been the criticism of a great Oxford scholar upon an early sketch of the *Instauratio*. And how little Bacon could trust for a favourable hearing of his case to his personal reputation among his contemporaries during the first fifty years of his life, appears from his hesitation, uncertainty, and anxiety as to the form in which he should cast it, and the manner in which he should bring it forward. For we find among these fragments not merely successive drafts of the same design, (which would prove nothing more than solicitude to do the work well,) but also experimental variations of the design itself, in which the same matter is dressed up in different disguises, with the object apparently of keeping the author out of sight; as if he had thought that a project of such magnitude would be entertained less favourably if associated with the person of one who had done nothing as yet to prove any peculiar aptitude for scientific investigation, or to entitle him to speak on such matters with authority. Thus at one time he seems to have thought of bringing his work out under a fanciful name, probably with some fanciful story to explain it; as we see in the mysterious title "*Valerius Terminus*, &c. with the Annotations of *Hermes Stella*." At another he presents the same argument in a dramatic form; as in the *Redargutio Philosophiarum*, where great part of what became afterwards the first book of the *Novum Organum* is given as a report of a speech addressed to an assembly of philosophers at Paris. At another he tries to disguise himself under a style of assumed superiority, quite unlike his natural style; as in the *Temporis Partus Masculus*, where again the very same argument (for it is but another version of the *Redargutio Philosophiarum*) is set forth in a spirit of scornful invective poured out upon all the popular reputations in the annals of philosophy; — a spirit not only alien from all his own tastes and habits moral and intellectual, but directly at variance with the policy which he was actually

pursuing in this very matter; which was to avoid as much as possible all contradiction and collision, and to treat popular prejudices of all kinds with the greatest courtesy and tenderness: — an inconsistency which I know not how to account for, except by supposing that he had been trying experiments as to the various ways in which popular opinion may be conciliated; and knowing that many a man had enjoyed great authority in the world by no better title than that of boldly assuming it, had a mind to try how he could act that part himself, and so wrote this exercise to see the effect of it; and finding the effect bad, laid it by. Another thought which he had, — still probably with the same view of avoiding the contrast between the lofty pretensions of the project and the small reputation of the author, — was to publish it in a distant place. In July, 1608, remembering that a prophet is not without honour except in his own country, he was considering the expediency of beginning to print in France.[1] And about the same time the idea of shadowing himself under the darkness of antiquity seems to have occurred to him: for I am much inclined to think that it was some such consideration which induced him in 1609 to bring out his little book *De Sapientiâ Veterum;* where, fancying that some of the cardinal principles of his own philosophy lay hid in the oldest Greek fables, he took advantage of the circumstance to bring them forward under the sanction of that ancient prescription, — and so made those fables serve partly as pioneers to prepare his way, and partly as auxiliaries to enforce his authority.

Altogether, the result of my endeavours to arrange and understand these experimental essays and discarded beginnings, is a conviction that Bacon was not more profoundly convinced that he was right, than uneasily apprehensive that his contemporaries would never think him so; and that for the first fifty years of his life his chief anxiety was, not so much to bring his work into the most perfect shape according to his own conception, as to bring it before the world in a manner which should insure patient and attentive listeners, and involve least risk of miscarriage, — the carrying of the world with him being in such an enterprise a condition essential to success. And this I have thought the more worth pointing out, because the course of

[1] Commentarius solutus.

proceeding which he ultimately resolved on tends to hide it from us. For his final resolution was, as we know, to discard all fictions and disguises, and utter his own thoughts in his own person after the manner which was most natural to him. But we are to remember that before he came to that determination, or at least before he put it in execution, the case was materially altered and the principal cause of embarrassment removed. For besides that he had then been four years Lord Chancellor, the great reputation which he had acquired in other fields — in the House of Commons, the Courts of Law, and the Star-Chamber, — coupled with the well-known fact that his favourite pursuit all the time had been natural philosophy, concerning which he had long had a great work in preparation, — this reputation had given to his name the weight which before it wanted; insomuch that there was then perhaps no mouth in Europe which could command a larger audience, or from which the prophecy of a new intellectual era coming upon the earth could proceed with greater authority, than that of Francis Bacon.

Nevertheless, when I say that these pieces are chiefly interesting on account of the light they throw on Bacon's personal hopes, fears, and struggles, I am far from meaning to underrate their intrinsic and independent value. Those who are most perfectly acquainted with the works by which they were superseded will not the less find them well worth the studying. Many of them are in form and composition among Bacon's most perfect productions; and if in successive processes of digestion he succeeded in sinking the thought deeper and packing the words closer, it was often at the expense of many natural and original graces. What they have gained in weight and solidity they have lost sometimes in freshness, freedom, and perspicuity; and it will generally be found that each helps to throw light on the other.

J. S.

COGITATIONES

DE

SCIENTIA HUMANA.

PREFACE

TO THE

COGITATIONES DE SCIENTIA HUMANA.

THE value of this collection would be much increased if the dates of the several pieces could be fixed, or even the order of succession. I fear however that it is impossible to do this with any certainty. I have arranged them in the order in which it seems to me most probable that they were written, but the evidence is so scanty and unsatisfactory that I wish every reader to consider it an open question and to judge for himself upon the data which will be laid before him.

This which I place first, and to which for convenience of reference I give the title *Cogitationes de Scientiâ Humanâ*, is a fragment, or rather three separate fragments, that have not been printed before. They are copied from a manuscript which came to the British Museum among the papers of Dr. Birch, who appears to have received it from the executors of Mr. John Locker. Locker was a friend of Robert Stephens, the Historiographer Royal; was employed by him to see through the press his second collection of Bacon's letters, published in 1734; was afterwards engaged in preparing an edition of all Bacon's works, but died before it was completed; whereupon the task, together with the papers which he had collected, was transferred to Dr. Birch.

Of the history of this manuscript I have not been able to learn anything beyond what appears upon the face of it. It is a transcript in a hand of the 18th century, and has evidently been made from a mutilated original; blank spaces having been left by the transcriber in several parts, such as would occur in the copy, not of an unfinished or illegible writing, but of one worn away at the edges of the outer leaves. The leaves of the

transcript are put together in a false order, and are not numbered; which makes it less easy to guess what the original consisted of. But it looks as if there had been three separate papers, each wanting a leaf or two at the beginning, and each containing a series of "Cogitationes" or short philosophical essays. The transcript has been corrected throughout by Locker himself and prepared for the press or the copyist; some passages being marked for omission, and some to stand, and titles being added to the latter. It seems that he meant to include in his edition of Bacon's works all those portions which were not to be found elsewhere in the same or nearly the same words. As these titles do not appear to have formed part of the original, I have omitted them here; my object being to print Bacon's own paper as Locker received it; which I suppose the transcriber to have copied as correctly as he could.

The subjects of cogitation are various, and not arranged in any logical order. I find interspersed among them the four fables, *Metis, Soror Gigantum, Cœlum,* and *Proteus,* exactly as they are printed in the *De Sapientiâ Veterum;* and the fifth, sixth, seventh, and tenth of the *Cogitationes de Rerum Naturâ,* exactly as they are given by Gruter; except a few verbal differences which I have pointed out where they occur. In the last mentioned (which forms the seventh article of the first fragment), the passage about the new star in Cassiopeia appears in the same words and with the same context precisely; and therefore the reasons which I have given for presuming that the *Cogitationes de Rerum Naturâ* were written before 1605 are equally applicable to this fragment. It is on this account that I place it first in the series; not that some of the other pieces contained in this part may not have been written earlier than 1605, but that there is none among them concerning which I have such good grounds for concluding that it cannot have been written later.

The Cogitatio in which this passage occurs is immediately followed by one on the true relation between natural philosophy and natural history; in which the kind of natural history on which a sound and active philosophy may be built is particularly described. If we could be sure that this also was written before 1605, the fact would be valuable; as showing that this part of the design was no after thought, but was as clearly conceived, and its essential importance as

fully recognised, in 1605 as in 1620. In the *Parasceve* and in the admonition prefixed to the *Historia Ventorum* (*monendi sunt homines*, &c.), the impossibility of carrying the work on without such a collection of natural history, though more fully and anxiously insisted upon, is not more distinctly understood. The presumption however which fixes the date of the preceding Cogitatio does not necessarily hold with regard to this, because it *may* no doubt have been added afterwards; and the word *partitionem* at the end of the paragraph in page 189 may seem to imply that it was meant for the *Partitiones Scientiarum*, and therefore written after the plan of the *Instauratio Magna* had been laid out in its ultimate form.

The miscellaneous character of these meditations makes the loss of the rest of less consequence. It is easy to strike into the argument of each, and to refer it to its proper place in Bacon's philosophy. It may be convenient however, as they are for the most part without explanatory titles, to give here a list of the several pieces, with a note of the subjects to which they refer.

FIRST FRAGMENT.

1. (Cog. 3.) *Of the limits and end of Knowledge:* the same argument which is handled in the first chapter of *Valerius Terminus*, and the opening of the *Advancement* of *Learning*. (The beginning wanting.)
2. (Cog. 4.) *Of the Use of Knowledge.*
3. (Cog. 5.) *The fable of Metis.*
4. (Cog. 6.) *The fable of the Sister of the Giants.*
5. (Cog. 7.) *The fable of Cœlum.*
6. (Cog. 8.) *The fable of Proteus.*
7. (Cog. 9.) *Of the error in supposing a difference in point of eternity and mutability between things celestial and things sublunary.*
8. (Cog. 10.) *Of Natural History considered as the groundwork of Natural Philosophy.* (Imperfect at the end.)

SECOND FRAGMENT.

1. (Cog. 8.) *That general consent affords no presumption of truth in matters intellectual.*

2. (Cog. 9.) *Of the error of supposing that conversancy with particulars is below the dignity of the human mind.*
3. (Cog. 10.) *The exposition of the fable of Midas.* (Not included in the *De Sapientiâ Veterum.*)

THIRD FRAGMENT.

1. *Of wisdom in the business of life.* (The beginning wanting.)
2. *That the quantum of matter is always the same.*
3. *Of the sympathy between bodies with sense and bodies without.*
4. *Of apparent rest, and solidity and fluidity.*

The notes to these pieces, and the explanatory remarks within brackets, are mine.

J. S.

COGITATIONES DE SCIENTIA HUMANA.

THE FIRST FRAGMENT.[1]

. . . . a Deo defectionem homini insinuavit.[2] Quod vero ad terminos sobrietatis attinet, eos demum legitimos et veros esse censemus, qui sensus aditum ad divina prohibeant; ut jam dictum est. Si enim per alas sensus male conglutinatas ad Dei naturam, vias, voluntatem, regimen, et reliqua mysteria, tanquam ex propinquo audacius conspicienda, superbo volatu efferamur, præcipitium certum nos manet. Atque hoc est quod per *fallaciam philosophiæ et gloriæ oppressionem* cavere jubemur. Quicquid vero non est Deus, sed pars Universi aut Creatura, hujus certe contemplatio et scientia obscuritate sæpius et difficultate removetur, sed nullo edicto separatur. Certe Scriptura, post vicissitudines rerum et temporum commemoratas, ad extremum subjungit: *Cuncta fecit bona in tempore suo, et mundum tradidit disputationibus eorum; ut tamen non inveniat homo quod operatus est Deus ab initio usque ad finem:* ubi satis aperte significat, tradi certe mundum hominum contemplationibus et controversiis, et infinitas et abditas Naturæ operationes posse erui; opus autem quod operatus est Deus ab initio usque ad finem, id est legem Naturæ summariam, quæ instar puncti verticalis Pyramidis est, in quo omnia coeunt in unum; hoc inquam, non aliud quicquam, ab Intellectu humano seponi. Nam ut idem Author affirmat, *Lucerna Dei est spiraculum hominis quo quæque interiora pervestigat;* et rursus ait, *Gloriam Dei esse rem celare, gloriam Regis autem rem investigare;* non aliter ac si Divina Natura innocenti ac benevolo puerorum ludo delectaretur, qui ideo se abscondunt ut inveniantur, ac animam humanam sibi

[1] Additional MSS. Brit. Mus. 4258. fo. 219.

[2] He has been speaking, probably, of the nature of the temptation which led to the fall of man; viz. the promise that he should be as God, *knowing good and evil.*

collusorem in hoc ludo pro sua in homines indulgentia et bonitate elegerit. Itaque Deum Fidei, mundum sensus et scientiæ humanæ, vera objecta esse ponimus. Quod vero ad artificium illud attinet, ut ex ignoratione causarum major sit manus divinæ recognitio et veneratio; hoc nil aliud est quam Deo per mendacium gratificari velle, quo ille prorsus nostro non eget. Etiam et illæ cogitationes parum piæ sunt, si quis Dei vicem timeat, ne religio detrimentum accipiat. Nam hæc rationem animalem et fidei inopiam sapiunt, et religionem tacite quodammodo imposturæ insimulant [ac] si periculum ei ab inquisitione veritatis subsit. Neque metuat quisquam ut Sensui Fides magis ex diametro opponi possit quam per ea quæ nunc, virtute afflatus divini, creduntur; mundi creationem ex nihilo; Dei incarnationem; carnis resurrectionem. Atque nobis certe perfectissimum est, Naturalem Philosophiam, post verbum Dei, certissimam superstitionis medicinam, eandem (quod mirum videri possit) probatissimum fidei alimentum esse; quantoque altius penetret, tanto fortius animos hominum religione perfundere. Nam in limine philosophiæ, in causis proximis moram faciendo, fortasse animus nonnihil deprimitur, et sensui obnoxius efficitur. Sed postquam ascensus factus est, et catena causarum ex opere divino fabrefacta in conspectum venit, erigitur proculdubio animus, et ad religionem præparatur. Itaque existimamus Scientiam de Natura tanquam fidissimam Religioni ancillam præsto esse, cum altera voluntatem Dei, altera potestatem manifestet. Neque erravit qui dixit *Erratis nescientes scripturas et potestatem Dei;* informationem de Voluntate, tanquam Fidei instrumentum, et meditationem de Potestate, tanquam ejusdem adminiculum, conjungens. Veruntamen (quod verum rebus humanis præsidium est) ad preces confugimus, et Deum supplices rogamus ne ex reseratione viarum sensus et accensione majore luminis naturalis aliquid incredulitatis aut noctis animis nostris erga divina mysteria oboriatur; sed potius ut ab intellectu a phantasiis et vanitate puro et repurgato, et divinis oraculis nihilominus subdito ac prorsus deditio, *Fidei dentur quæ Fidei sunt.*

Cogitatio 4ta.

Atque cum de terminis et finibus Philosophiæ jam dictum sit, res postulare videtur ut de usu ejus aliquid addamus.

Omnis enim scientia usu prudenter terminatur; atque usui nomen finis vel præcipue competit: in quo altius rem repetere visum est, ut fortius quod tantum hominum intersit mentibus eorum incutiamus. In Divina Natura radius trinus per omnia splendet, et in operibus et in attributis. Essentia et Creatio Materiæ ad Patrem; Essentia et Creatio Formæ ad Filium; duratio et conservatio Essentiæ ad Spiritum Sanctum refertur. Neque enim ait Scriptura *Dixit Deus, fiat Cœlum et Terra*, sed *Creavit Deus Cœlum et Terram.* De operibus autem sex dierum, no nait Scriptura *Creavit Deus Lucem* et quæ sequuntur; sed *Dixit Deus, fiat Lux, et facta est Lux;* et per omnia Creationem præcedit Verbum. Similiter, Potentia Patri, Sapientia Filio, Charitas Spiritui Sancto attribuitur; ut et peccata iisdem attributis respondeant; cum peccata ex infirmitate contra Patrem; peccata ex ignorantia contra Filium; peccata ex malitia contra Spiritum Sanctum esse dicantur. Etiam origines defectionis eodem spectant. Nam ex appetitu potentiæ angeli lapsi sunt; ex appetitu scientiæ homines; sed Charitatis non est excessus; neque inducit charitas tentationem, neque Spiritus aut homo per eam unquam in periculum venit. Qui enim ex plenitudine charitatis sibi exitium et anathema imprecati sunt, ut Paulus et Moses, utcunque in extasi spiritus eo progressi, tamen offensionem apud Deum incurrisse non reperiuntur. Itaque Deus proponitur hominibus ad imitationem, secundum Charitatem, non secundum Potentiam aut Sapientiam. Scriptum enim est, *Diligite inimicos vestros ut sitis filii Patris vestri qui in Cœlis est; qui solem suum oriri facit super bonos et malos, et pluit super justos et injustos.* Angelus autem dixit in se, *Ascendam et ero similis Altissimo:* non dixit *Deo,* sed *Altissimo.* Similiter Homo, postquam tentationem hausisset, efferebatur, et concupivit ut similis esset Deo; non simpliciter, sed in hoc ut sciret Bonum et Malum. Neuter ad similitudinem charitatis divinæ se excitabat; sed Angelo ministerii Dominatio, Creaturæ dominanti Scientia, desiderio fuit. Atque hæc in præsenti adducimus, ut homines tantis oraculis moniti scientiæ veros fines cogitent; nec eam aut animi causa petant, aut ut alios despiciant, aut ad commodum, aut ad lucrum, aut ad gloriam, aut hujusmodi inferiora. Atque hic rursus, ut prius, Deum precamur ut deposito scientiæ veneno, a serpentis veneno jam a principio infuso, quo animus humanus tumet, nec altum

sapiamus, nec ultra sobrium, sed Veritatem in Charitate colamus.

Cogitatio 5ta.

Narrant poetæ antiqui Jovem cepisse in uxorem Metin, &c.

[Here follows the exposition of the fable *Metis sive Consilium*, for which see *De Sapientiâ Veterum*, § xxx.]

Cogitatio 6ta.

Finxere poetæ Gigantes e terrâ procreatos, &c.

[Here follows the exposition of the fable *Soror Gigantum sive Fama;* for which see *De Sap. Vet.* § x.]

Cogitatio 7ma.

Finxere poetæ Cœlum antiquissimum, &c.

[Here follows the exposition of the fable *Cœlum sive origines;* for which see *De Sap. Vet.* § xii.]

Cogitatio 8a.

Narrant poetæ Proteum, &c.

[Here follows the exposition of the fable *Proteus sive Materia;* for which see *De Sap. Vet.* § xiii.]

Cogitatio 9a.

De dissimilitudine cœlestium et sublunarium quoad æternitatem et mutabilitatem, quod non sit verificata.

[See *Cogitationes de Rerum Naturâ*, § x., p. 32. of this volume. These five Cogitationes agree exactly with the copies elsewhere given, with the exception of a very few verbal variations, which I have mentioned in the notes. With regard to the last it is to be observed that, though it follows the 8th Cogitatio without any break, the words *Cogitatio* 9a. are not written at the head of it, as in all the preceding; but *Cog.* 10. is inserted in the margin; from which I infer that it was not numbered in the original, and that the number 10 was inserted afterwards by the transcriber in reference to the *Cogitationes de Rerum Naturâ* where it stands tenth and last. That it formed part of the present series however, and

belonged to this place, may be inferred from the fact that it is immediately followed by]

Cogitatio 10ª.

Fundamenta solida Philosophiæ Naturalis purioris, in Naturali Historia jaciuntur; eaque copiosa et accurata. Aliunde petita philosophia natat et ventosa est et agitatur et se confundit; nec ad utilitates humanas et partem activam ducit[1] aut pertingit. Atque ut distinctius loquamur, Historia Naturalis aut non satis investigata aut non satis inspecta duo vitia et veluti morbos aut corruptiones Theoriarum peperit. In altero homines ad Sophistæ potius, in altero ad Poetæ partes accedunt. Qui enim ex vulgaribus observationibus theoriæ principiis concinnatis, reliqua in ingenii discursu et argumentatione ponit, is quamcunque existimationem aut fortunam Inventa sua sortiantur, tamen revera ex veterum Sophistarum more et disciplina philosophatur. Qui autem ex portione Naturæ diligenter et exquisite indagata et observata tumidus et phantasiæ plenus alia omnia ad ejus exemplum et similitudinem fieri fingit et somniat, is inter Poetas sane est conscribendus. Itaque prudens et acutum erat illud Heracliti dictum cum quereretur homines Philosophiam in mundis propriis non in mundo majore quærere. Naturalem enim Historiam leviter attingunt, atque in meditationibus suis in immensum expatiantur; neque hæc prudenter dividunt. Atque hujus rei exemplum, præsertim morbi illius prioris, in Philosophis Scholasticis se prodit; qui cum ingenii acumine et robore pollerent, et otio abundarent; historiæ autem aut naturæ aut temporum parvam partem nossent; nec omnino variam doctrinam hausissent; sed meditationes suas intra veluti cellas paucorum authorum, præcipue Aristotelis (qui dictaturam apud eos gerebat), quemadmodum personas intra cellas monasteriorum et collegiorum clausissent; ferocitatem autem et confidentiam eam quæ illos qui pauca norunt sequi solet (ut animalia in tenebris educata) acquisivissent; ex materiæ quantitate non magna, ingenii vero agitatione infinita, telas eas doctrinæ confecerunt, quæ (ut illæ etiam aranearum) tenuitate fili et texturæ subtilitate sunt admirabiles, sed substantia et virtute fere inutiles. Longe autem magis mirandum est Aristotelem, tantum virum, et tanti Regis opi-

[1] *durat* in MS.

bus innixum, et in tanta rerum et historiæ varietate versatum, quique ipse tam accuratam de Animalibus historiam conscripserit, atque insuper experimentis cujusvis generis cogitationem impertierit, (quod ex libris ejus Problematum et Parvis Naturalibus manifestum est), quique etiam[1] sensui justas partes tribuerit; tamen Philosophiam suam de Natura a Rebus omnino abstraxisse[2], et experientiæ desertorem maximum fuisse, atque ea tantis laboribus peperisse quæ Dialecticæ potius (utcunque homines distinguant et argutentur[3]) quam Physicæ aut Metaphysicæ sint accommodata. Verum ille ingenio incitato et imperioso, atque per omnia ipse sibi author (cum antiquitatem despiceret, experientiam autem in servilem modum ad opinionum suarum fidem traheret et quasi captivam circumduceret), meritoque sane galeam Plutonis (obscuritatem scilicet quandam artificiosam) induens, cum tantas turbas concivisset; denique Dialecticam suam, utpote artem ab eo (ut ipse licentius nec tamen vere gloriatur) oriundam, interponens, et res verbis mancipans, varietatem doctrinæ et scientiæ suæ usu ambitioso et callido corrupit. Nos vero, licet propter facultatis nostræ tenuitatem statuam Philosophiæ efformare aut erigere non possimus, saltem basin ei paremus, atque Historiæ Naturalis usum et dignitatem hominibus præcipue commendemus. Neque enim inventio prima Philosophiæ tantum ab ea pendet, sed etiam omnis inventorum amplificatio et correctio. Ut enim aquæ non altius ascendunt quam ex quo descenderunt, ita doctrina et informatio ab aliquo authore veluti cisterna quadam derivata non facile supra ejusdem authoris inventa scandit aut insurgit. Ipsi rerum fontes petendi sunt. Quamobrem si qua nobis fides est aut judicium in his rebus, quas certe summa cum cura et maximis et indefessis animi laboribus tractamus, id ante omnia consulimus et monemus, ut Historia Naturalis diligens et seria et fida procuretur et comparetur. Atque habemus sane Historiam Naturalem, mole amplam, genere variam, diligentia etiam curiosam; veruntamen si quis ex ea ipsa fabulas et antiquitatis mentionem et philologiam et opiniones et similia excerpat ac seponat, quæ convivalibus potius sermonibus et virorum doctorum noctibus quam institutioni Philosophiæ sunt accommodata, ad nil magni res recidet. Neque novum est invenire diligentiam simul in rebus supervacuis curiosam et in magis necessariis imparem. Atque hoc

[1] *enim* in MS. [2] *abstraxisset* in MS. [3] *arguentur* in MS.

minime mirum videri debet, Naturalem Historiam quæ in manibus habetur[1] non eam esse quam nos animo et cogitatione metimur et concipimus, cum hoc plerunque fiat, ut quod fine id fere natura et genere differat. Naturalis autem Historiæ inquisitio ab aliquibus suscepta est ut jucunda et grata peregrinatio, quæ et cognitione et commemoratione delectet. Aliis doctrinæ variæ et lectionis multiplicis fama est quæsita. Nobis autem longe aliud propositum est. Eam enim Naturalem Historiam quærimus ex qua causæ naturales potissimum informari possint, et Philosophia condi, sensui fida, et operibus testata. Itaque magna cura et judicii severitas adhibenda est ut hujusmodi Historia[2] sit fide certa, observatione definita non vaga, complexu rerum lata et copiosa. Atque ut clarius et melius intelligatur quid tandem desideremus[3] et velimus, non alia magis ratione illud declarari posse judicamus quam si Partitionem Naturalis Historiæ subjungamus fini ipsi nostro consentaneam.

Historia [Naturalis[4],] vel Naturæ liberæ et tamen ordinatæ, [vel Na]turæ errantis sive expatiantis, vel Naturæ [arte] subactæ et constrictæ, facinora narrat. Alia enim est Naturæ dispensatio et actio cum sponte fluit; alia cum materiæ defectibus et excessibus et pravitatibus et insolentiis urgetur; alia denique cum arte et ministerio humano premitur. Itaque prima narratio est ea cui Naturalis Historiæ Communis appellatio tribuitur; cujusmodi est Aristotelis, Plinii, Dioscoridis, Gesneri, Agricolæ, reliquorum. Secunda, Historia Mirabilium nuncupatur, aut simili titulo gaudet; quam etiam Aristoteles ipse non contempsit, alii autem ita tractarunt ut eorum vanitatis et levitatis nota in rem ipsam incurrat. Tertia est Historia Mechanica sive Artium; cui nemo incubuit aut operam constantem et justam impendit; sed alii alias artes, neque tamen multi multas, scripto aliquo fortasse [tractarunt] eoque ipso obscuro et ignobili, et [quod] apud plerosque lectores sordescit. Atque earum partium prima rursus in quatuor partes recte dividitur; Historiam Cœlestium; Historiam Meteororum; Historiam Terræ et Maris; et Historiam Specierum. Historiam Cœlestium simpliccm esse cupimus; suspensa omnino vi et potestate Theoriarum; quæque solummodo phænomena ipsa

[1] *habemus* in MS. [2] *historiæ* in MS. [3] *desyderemus* in MS.
[4] The spaces between the brackets are left blank in the manuscript. The words which I have inserted are supplied by conjecture.

sincera, nempe astrorum numerum, magnitudinem, situs, facies, motus, complectatur; non omissa rerum vulgatissimarum mentione, eaque exacta; addita etiam observatione colorum, scintillationum, positionum, et similium, licet ad cursus astrorum descriptionem nil faciant. Non enim calculos meditamur, sed Philosophiam; eam quæ scilicet de superiorum non motu tantum, sed substantia quoque et potestate, intellectum humanum informare possit. Historia vero Meteororum (ut et ipsa) ex imperfecte mistis est. Postquam Aristoteles[1] principia rei dedisset (licet diverso ab Historia modo) nulla quæ mentione digna est continuatio sequuta est, quæ tamen huic parti vel maxime a . . .[2] res sit ex naturalibus maxime instabi[lis et] quæ regionibus et temporibus plurimum [vari]etur. Si quid autem in Historia Civili et annalibus temporum, de meteoris, aliquibus cometis, terræ motibus, tempestatibus, et hujusmodi, sparsim inseritur, illud sæpius ejusmodi est ut potius calamitatis et ominis rei quam naturæ et modi meminerit. Certe inter Meteororum Historiam dignissima commemoratio fuisset de Cometis, utilissima de Ventis. Nec ea spernenda esset quæ est de pluviis prodigiosis vel de rebus quæ ex alto decidunt, si fides constaret. At Historia Terræ et Maris ad pauca extenditur, licet ea quæ ad sphæram et partium terræ cum partibus cœli configurationem pertinent recipiantur. Neque enim termini Imperiorum, urbes, et similia, quæ Cosmographiam implent, Naturalis Historiæ sunt; cum vicissitudines manifestas patiantur et hominem plane spirent. Terræ figura, maris interpositio et occupatio, minerarum moles, solum ipsum non feracitate [sed] substantia distinctum, fluvii, la[cus, si]nus, litora, paludes, æstus maris, gurgites et Euripi, aquæ calidæ et varie . . . infectas[3] igne exundantes, et reliqua id genus, hujusmodi narrationi debentur: res sane vulgatæ, sed consequentiæ earum non vulgatæ. Nam maria inter Tropicos, et magna utrimque a Tropicis distantia, pervia non esse; duas insulas veteris et novi orbis versus Boream latas, versus Au-[strum angustas] efformari; Africam et inferiorem Americam peninsulas esse; Mediterraneum mare sinuum, Caspium [l]acuum, maximum conspici; et similia; si per se accipias occurrunt, sed tamen Philosophia consuluntur et ad multa in-

[1] *Aristotelis* in MS.
[2] *debetur, cum?* The top of the *d* being worn off, it would look like *a*.
[3] So in MS. The blank may be filled with *per rimas*.

formationem præbent. Restat Historia Specierum, quæ certe tam diligenter et copiose elaborata et exculta cernitur, ut non tam aucta ea quam repurgata opus est. Namque[1] multus Plinius in fabulis, antiquitate, et censura morum; Gesnerus autem hæreditatem historiæ suæ ex multis partibus Philologiæ ex paucis Philosophiæ . . . Certe si qua ex parte deficit Historia Naturalis Specierum, ea ipsa est quæ [Hominem] intuetur et refert. Demptis enim c[ivilibus,] parca est Hominis historia naturalis quæ sincera est. Reliqua duo Historiæ Naturalis genera hominibus summæ curæ esse debent. Habet enim historia naturæ sponte sua fusæ contemplationem amœnam, sed inquisitionem vagam. Historia autem Mirabilium homines ad operum magnitudinem invitat; Historia Artium etiam deducit. Itaque quod ad prim[um horum] attinet, facessant fabulæ, imposturæ, levia. Heteroclita sive Devia naturæ examinentur tanquam falsa, referantur et describantur tanquam vera; id est, non aucta re miraculi causa, sed potius intra modum. Ante omnia, fabulæ et mendacia non tantum rejiciantur, sed etiam notentur. Neque enim magis utilem Historiæ Naturalis de Mirabilibus partem esse censeo, quam si ea quæ [apud vulgus opi]nionem quandam veritatis obtinent, [sed facto] experimento falsitatis convincuntur, nominatim damnentur et pro[scribantur.]

[Here the blanks left by the transcriber become so frequent that it is impossible to follow the sense further. Only it may be gathered that, after remarking that "as things now are, if an untruth in nature be once on foot, what by reason of the neglect of examination and countenance of antiquity, and what by reason of the use of the opinion in similitudes and ornaments of speech, it is never called down,"—(I quote a passage from the *Advancement of Learning* with which it is evident that the next sentence in this manuscript closely corresponded,) — Bacon has recourse to the illustration so happily developed in the 118th aphorism of the first book of the *Novum Organum*, comparing the mistakes which will occur in such a natural history as he meditates to the misprints in a book; — if there be but a few, you can correct them by the sense of the passage; if many, you cannot find what the sense is: so it is, he says, with Natural History and

[1] *Nam qua* in MS.

Philosophy. "Nam si pauçæ vanitates admisceantur, eæ a causis ipsis inventis reprobantur; sin spissæ, ipsam causarum inquisitionem subvertunt. Itaque optimo consilio res geretur, si triplex fidei ordo statuatur. Unus eorum quæ damnantur; alter eorum quæ certo comperiuntur; tertius eorum quæ fidei sunt [dubiæ.]" He concludes his remarks on the Historia Mirabilium by observing that it is useful in two ways — both excellent: "the one" (again I quote the *Advancement of Learning*, for the fragments of the sentence clearly show that it was to the same effect,)—"the one to correct the partiality of axioms and opinions, which are commonly framed only upon common and familiar examples; the other because from the wonders of nature is the nearest intelligence and passage towards the wonders of art; for it is no more but by following and as it were hounding nature in her wanderings, to be able to lead her afterwards to the same place again."

He then proceeds to speak of the Historia Mechanica, — the third and last. And here, the blanks being fewer, the sense may be clearly traced, and the missing words probably supplied.]

Sequitur et superest [Historia] Naturalis Mechanica, sive Exper[ientiæ] qualem artes exhibent: ut agric[ultura], Pictoria [1], Tinctoria, Fabrilis. Addo [etiam practicas] omnes, licet in artem non coaluerint, ut [ve]nationum, aucupiorum, piscationum. N[eque tamen] excludo mechanicam partem liberalium artium, quas vocant; Musicæ, Perspectivæ, Medicinæ. Hæc autem historia licet res minus solemnis sit et honoris et

. . . . . .

[And here the manuscript suddenly stops in the middle of the page; being evidently a transcript from an original of which the outside leaves had been torn away, and the others more or less injured, — most towards the end.]

[1] *pinctura* in MS.

COGITATIONES DE SCIENTIA HUMANA.

THE SECOND FRAGMENT.

De Scientiis et mente. De præjudicio consensus, quod infirmum sit.[1]

Consensus in doctrinis receptis, cujus ea est potestas ut vim quandam hominum judiciis faciat et contradictionem omnem infamet, recte perpendenti et sanam mentem adducenti tantum a vera et solida authoritate abest ut præsumptionem violentam inducat in contrarium. Scientiarum enim status certe perpetuo est democraticus, qui status tempestas et insania in civilibus appellari consuevit. Neque multo melius se gerit aut probat in intellectualibus. Apud populum enim doctrinæ contentiosæ et pugnaces, aut rursus probabiles et speciosæ, plurimum vigent; quales videlicet assensum aut illaqueant aut alliciunt. Itaque pessimus augur veritatis, studium et admiratio populi. Si quis autem hæc ita fieri concedat, et sit firmior, et turbam professoriam non admodum vereatur, sed cum inter eos non paucos ingenio et judicio excellere videat, horum suffragiis moveatur; sciat se ratione fallaci niti. Dubium enim non est, quin per singulas ætates maxima ingenia vim passa sint, dum viri captu et intellectu non vulgares, nihilo secius existimationi suæ caventes, temporis et multitudinis judicio se submiserunt. Non enim apud eosdem est pretium scientiarum et possessio: sed quæ viri præstantes proponunt vulgus æstimat. Quod si cui adhuc tamen mirum videatur quod tot sæculis nil melius his quibus utimur inveniri potuerit, is non meminit hoc sæpius accidere temporibus retroactis potuisse, ut potiora istis caput extulerint et in lucem venerint; verum cum penes populum (ut dictum est) sit judicium et delectus, memoriam eorum interire necesse est; adeo ut altiores contemplationes oriantur aliquando, sed

[1] Additional MSS. 4258. fo. 214. This begins at the top of a page, and is not numbered. But as the other two Cogitations which complete this fragment are numbered 9 and 10, I conclude that this was in fact *Cogitatio* 8ª, the first seven having been lost.

fere non ita multo post opinionum vulgarium ventis agitentur[1] et extinguantur. Quare non dissimulanter monendum et prædicendum est (ne quis fortasse de expectatione sua decidat) veras de natura opiniones a vulgaribus in immensum removeri, et fere religionis instar duras et interdum primo aspectu prodigiosas ad hominum sensus et captus accedere; ut in Democriti opinione de Atomis usu venit, quæ quia paulo interioris notæ erat, lusu excipiebatur. Verum hæc ad animos hominum sanandos qui consensu perstringuntur pertinent.

Cogitatio 9ª.

Insita est in animis hominum a natura et a disciplina opinio et æstimatio tumida et damnosa, quæ philosophiam veram et activam veluti exilio mulctavit, et omni aditu prohibuit. Ea est, minui majestatem mentis humanæ si in experimentis et rebus particularibus, sensui objectis et in materia terminatis, diu et multum versetur; præsertim cum hujusmodi res ad inquirendum laboriosæ, ad meditandum ignobiles, ad dicendum asperæ, ad practicam illiberales, numero infinitæ, et subtilitate pusillæ, videri soleant[2]; adeo ut scientiarum gloriam et nomen polluere fere existimentur. Quin eo usque vanitas ista, et mentis, si verum nomen quæratur, alienatio et excessus, provecta est, ut veritas veluti animæ humanæ indigena, sensus autem intellectum excitare non informare, ab aliquibus assereretur. Neque errorem istum ab iis corrigi contigit qui sensui debitas, id est primas, partes tribuerunt; verum ex his quoque plurimi exemplo et facto suo, relicta omnino historia naturali et mundana perambulatione, omnia in meditatione et ingenii agitatione posuerunt; et sub specioso speculationum et rationalium titulo hominum mentes ad rerum evidentiam nunquam satis applicatas et addictas, inter opacissima et inanissima mentis Idola perpetuo volutare docuerunt.[3] Verum istud rerum particularium repudium et divortium omnia in familia humana turbavit. Neque tantum homines monendi sunt ut experientiæ se restituant atque intellectus commentis et meditationum simulacris non amplius confidant, verum ut inter experimenta ipsa, sive instantias, nec res exiles tanquam leves, nec res vulgatas tanquam superfluas, nec res mechanicas tanquam viles, nec res turpes tanquam indignas, nec

[1] *agitantur* in MS. [2] *solent* in MS. [3] *docuerant* in MS.

res præter naturam tanquam odiosas aut infaustas, despiciant aut rejiciant. Sane si capitolium aliquod humanæ superbiæ condendum et dedicandum esset, non nisi auri fortasse et argenti et eboris ramenta et hujusmodi res preciosas ad fundamenta ejus ingerere per pontifices liceret. Sed cum templum sanctum ad instar mundi, mundoque ipsi quantum fieri potest parallelum et concentricum, fundandum sit, merito exemplar per omnia sequi oportet. Nam quod essentia dignum est id etiam dignum est repræsentatione. Scientia autem vera nil aliud est quam essentiæ repræsentatio sive imago. Atque certe quemadmodum e certis putridis materiis optimi odores se diffundunt, ita et ab instantiis sordidis (quibus ut ait Plinius etiam honos præfandus sit) quandoque eximia lux et informatio exhibetur. Eodem modo et res tenues locupletes sæpe testes sunt. Bulla in aquis est res exilis et quasi ludicra; tamen haud aliam instantiam reperias quæ duarum rerum paulo obscuriorum commodius fidem faciat. Una est de appetitu continuitatis etiam in Liquidis; altera quod aër non magnopere feratur sursum. Etiam nobile illud inventum de acu nautica, quæ stellis ipsis est stella certior, in acubus ferreis, non in virgis aut vectibus ferreis, se conspiciendum dedit. Itaque postulanda est ab hominibus res difficilis sane, et a natura humana prorsus aliena, sed imprimis utilis. Hæc est ut eandem diligentiam, attentionem, perspicaciam, in rebus vulgaribus, parvis, et obviis contemplandis et examinandis sibi imperent, quam in rebus novis et magnis et miris curiositas humana adhibere solet: ratio enim non aliter constat. Neque enim hoc est scire aut causam reddere, si rara ad vulgata referantur et accommodentur; sed ut eorum quæ raro et eorum quæ frequenter accidunt, causæ constantes et communes inveniantur.

Cogitatio 10ª.

Fabula de servo Midæ ad libellos famosos pertinere videtur. Narrant enim Midæ cubicularium cum animadvertisset dominum suum aures habere asininas, id nulli mortalium dicere ausum fuisse; sed cum futilitatem naturalem reprimere non potuisset, cum ore in terræ rimam applicato quod viderat retulisse; unde arundines editas esse, quæ levi aura motæ illud murmure et susurro enuntiarent. Sensus est: cum regum et procerum defectus et vitia ministris interioribus innotuerint,

eos vanitate aulica et palatina secreti impatientes esse, nec debito silentio ea cohibere. Ac si forte verbis abstineant, tamen aliis indiciis ea prodere, quæ postea in calamos ingeniorum malignorum incidant; qui maxime sub inclinatione temporis ad turbas et rerum tumorem (tanquam vento flante) invidiosis et amosis libellis ea spargunt in vulgus.

[Here the manuscript stops before the bottom of the page; and the other page is left blank.]

COGITATIONES DE SCIENTIA HUMANA.

THE THIRD FRAGMENT.

. . .[1] hominum actiones æquæ et indifferentes, et propterea vel optime [mo]rato liberæ sunt. Rebus autem agendis et usui singula, et interdum quæ minima videntur, aut prosunt aut officiunt. Adeo ut verba, vultus, oculi, gestus, joci, sermo quotidianus, ad rem faciant, et nil fere imperio et decreto vacet. Etiam virtutis formæ magis simplices et inter se consentientes sunt. Prudentia autem Civilis innumeras formas, easque maxime inter se contrarias, quæ rebus, personis, temporibus, conveniant, desiderat. Adeo ut mirum minime sit si fabula Protei ad viros prudentes transferatur; qui ab occasionibus constricti in omnes formas se vertunt, donec liberi ad naturas suas redeant. Atque sane admirabilis est species viri vere politici, in quo nil absonum, nil neglectum, nil stupidum, nil impotens, reperire liceat; sed qui sibi, cæteris, rebus, temporibus, debita tribuens, et negotiorum principia, media, clausulas, periodos, distinguens, singula cum delectu faciat. Perfectissimus autem animi status, si sanitas affectuum accedat et boni fines. Qui autem ex philosophiæ disciplina civilibus rebus abstinent, aut in iisdem [se] versantes tam multa devitant ut actionum magnitudinem destruant; ii omnino similes sunt iis qui ut valetudinem conservent corporibus suis vix utuntur, et maximam temporis partem eorum curæ impendunt. Itaque ista, *non frui ut non cupias, non cupere ut non metuas,* quædam animi angustiæ sunt; et major est virtus quæ se sustinet quam quæ se cohibet.

[1] Additional MSS. 4258. fo. 223. This fragment begins at the top of a page, without anything to show how much is missing. It is evidently the conclusion of a *Cogitatio de Prudentiâ civili;* and appears to commence in the middle of a discussion concerning the difficulty of civil as compared with moral wisdom.

De Quanto Materiæ certo et quod[1] *mutatio fiat absque interitu.*

[See *Cogitationes de Rerum Naturâ*, § v. This is not numbered; and the word *Cogitatio* has been written in the margin by the transcriber, as if it had not been in the original.]

Cogitatio 7ª.

De Consensu Corporum quæ sensu prædita sunt, et quæ sensu carent.

[See *Cogitationes de Rerum Naturâ*, § vii.]

Cogitatio 6ª.

De Quiete apparente et consistentia et fluore.

[See *Cogitationes de Rerum Naturâ*, § vi.

The concluding sentence of this Cogitatio is not found in Gruter's copy. In this transcript it closes a paragraph and comes to the bottom of the leaf; making it doubtful whether the original ended here or not. It is to be observed that the numbers of the last two Cogitationes are out of order, and coincide with those in Gruter. It may be therefore that they were not in the original, but inserted by way of reference.]

[1] *quæ* in MS.

VALERIUS TERMINUS.

F. H. Anderson, The Philosophy of F. B. (Chicago, 1948), pp. 16-17
shows that King James is meant (Hermes stellata = star
symbol of illumination & royalty; Hermes = Jas. in Introd.
to The Advancement of Learning.

PREFACE

TO

VALERIUS TERMINUS.

BY ROBERT LESLIE ELLIS.

THE following fragments of a great work on the Interpretation of Nature were first published in Stephens's Letters and Remains [1734]. They consist partly of detached passages, and partly of an epitome of twelve chapters of the first book of the proposed work. The detached passages contain the first, sixth, and eighth chapters, and portions of the fourth, fifth, seventh, ninth, tenth, eleventh, and sixteenth. The epitome contains an account of the contents of all the chapters from the twelfth to the twenty-sixth inclusive, omitting the twentieth, twenty-third, and twenty-fourth. Thus the sixteenth chapter is mentioned both in the epitome and among the detached passages, and we are thus enabled to see that the two portions of the following tract belong to the same work, as it appears from both that the sixteenth chapter was to treat of the doctrine of idola.

It is impossible to ascertain the motive which determined Bacon to give to the supposed author the name of Valerius Terminus, or to his commentator, of whose annotations we have no remains, that of Hermes Stella. It may be conjectured that by the name Terminus he intended to intimate that the new philosophy would put an end to the wandering of mankind in search of truth, that it would be the *terminus ad quem* in which when it was once attained the mind would finally acquiesce.

Again, the obscurity of the text was to be in some measure removed by the annotations of Stella; not however wholly, for Bacon in the epitome of the eighteenth chapter commends

the manner of publishing knowledge "whereby it shall not be to the capacity nor taste of all, but shall as it were single and adopt his reader." Stella was therefore to throw a kind of starlight on the subject, enough to prevent the student's losing his way, but not much more.

However this may be, the tract is undoubtedly obscure, partly from the style in which it is written, and partly from its being only a fragment. It is at the same time full of interest, inasmuch as it is the earliest type of the *Instauratio*. The first book of the work ascribed to Valerius Terminus would have corresponded to the *De Augmentis* and to the first book of the *Novum Organum*, the plan being that it should contain whatever was necessary to be known before the new method could be stated. In the second book, as in the second book of the *Novum Organum*, we should have found the method itself.

The *Advancement of Learning*, which was developed into the *De Augmentis*, corresponds to the first ten chapters of *Valerius Terminus*, and especially to the first and tenth. To the remainder of the book (a few chapters are clearly wanted after the last mentioned in the epitome) corresponds the first book of the *Novum Organum*. The tenth chapter, of which we have only a small fragment, is entitled "The Inventory, or an Enumeration and View of Inventions already discovered and in use; together with a note of the wants, and the nature of the supplies." It therefore corresponds to the second book of the *Advancement*, and to the last eight books of the *De Augmentis*, but would doubtless have been a mere summary.[1] When Bacon subsequently determined to give more development to this part of the subject, he was naturally led to make a break after the inventory, and thus we get the origin of the separation between the *De Augmentis* and the *Novum Organum*.

The most important portion of *Valerius Terminus* is the eleventh chapter, which contains a general statement of the problem to be solved. It corresponds to the opening axioms of the second book of the *Novum Organum*, but differs from them in containing very little on the subject of forms. What Bacon afterwards called the investigation of the form he here calls the freeing of a direction. The object to be sought for is, he says, "the revealing and discovering of new inventions

[1] See my note at the end of this Preface.—*J. S.*

and operations."—"This to be done without the errors and conjectures of art, or the length or difficulties of experience." In order to guide men's travels, a full direction must be given to them, and the fulness of a direction consists in two conditions, certainty and liberty. Certainty is when the direction is infallible; liberty when it comprehends all possible ways and means. Both conditions are fulfilled by the knowledge of the form, to which the doctrine of direction entirely corresponds. This correspondency Bacon recognises towards the end of the chapter, but in illustrating the two conditions of which we have been speaking he does not use the word form. The notion of the form or formal cause comes into his system only on historical grounds. In truth, in *Valerius Terminus* he is disposed to illustrate the doctrine of direction not so much by that of the formal cause as by two rules which are of great importance in the logical system of Ramus. "The two commended rules by him set down," that is by Aristotle, "whereby the axioms of sciences are precepted to be made convertible, and which the latter men have not without elegancy surnamed, the one the rule of truth because it preventeth deceipt; the other the rule of prudence because it freeth election; are the same thing in speculation and affirmation, which we now affirm." And then follows an example, of which Bacon says that it "will make my meaning attained, and yet percase make it thought that they attained it not." In this example the effect to be produced is whiteness, and the first direction given is to intermingle air and water; of this direction it is said that it is certain, but very particular and restrained, and he then goes on to free it by leaving out the unessential conditions. Of this however it is not now necessary to speak at length; but the "two commended rules" may require some illustration.

In many passages of his works Peter Ramus condemns Aristotle for having violated three rules which he had himself propounded. To these rules Ramus gives somewhat fanciful names. The first is the rule of truth, the second the rule of justice, and the third the rule of wisdom. These three rules are all to be fulfilled by the principles of every science (axiomata artium). The first requires the proposition to be in all cases true, the second requires its subject and predicate to be essentially connected together, and the third requires the converse of the proposition to be true as well as

the proposition itself. The whole of this theory, to which Ramus and the Ramistæ seem to have ascribed much importance, is founded on the fourth chapter of the first book of the *Posterior Analytics.* Aristotle in speaking of the principles of demonstration explains the meaning of three phrases, *κατὰ παντός, de omni; καθ' αὑτό, per se;* and *καθόλου, universaliter.* When the predicate can be affirmed in all cases and at all times of the subject of a proposition, the predication is said to be *de omni* or *κατὰ παντός.* Again, whatever is so connected with the essence of a thing as to be involved in its definition is said to belong to it *per se, καθ' αὑτό,* and the same phrase is applicable when the thing itself is involved in the definition of that which we refer to it. Thus a line belongs *per se* to the notion of a triangle, because the definition of a triangle involves the conception of a line, and odd and even belong *per se* to the notion of number, because the definition of odd or even introduces the notion of a number divisible or not divisible into equal parts.[1] Lastly, that which always belongs to any given subject, and belongs to it inasmuch as it is that which it is, is said to belong to it *καθόλου, universaliter.* Thus to have angles equal to two right angles does not belong to any figure taken at random, it is not true of figure *κατὰ παντός,* and though it is true of any isosceles triangle yet it is not true of it in the first instance[2] nor inasmuch as it is isosceles. But it is true of a triangle in all cases and because it is a triangle, and therefore belongs to it *καθόλου, universaliter.* It is manifest that whenever this is the case the proposition is convertible. Thus a figure having angles equal to two right angles is a triangle.

Aristotle is not laying down three general rules, but he was understood to do so by Ramus — whose rules of truth, justice, and wisdom respectively correspond to the three phrases of which we have been speaking.

Bacon adopting two of these rules, (he makes no allusion to that of justice,) compares them with the two conditions which a direction ought to fulfil. If it be certain, the effect will follow from it at all times and in all cases. And this corresponds to the rule of truth. If it be free, then whenever

[1] Aristotle mentions a third sense of *κατὰ παντός,* which it is not here necessary to mention.

[2] *ἀλλ' οὐ πρῶτον, ἀλλὰ τὸ τρίγωνον πρότερον.*

the effect is present the direction must have been complied with. The presence of either implies that of the other. And this is the practical application of the rule of wisdom.

I have thought it well to enter into this explanation, because it shows in the first place that the system of Peter Ramus had considerable influence on Bacon's notions of logic, and in the second that he had formed a complete and definite conception of his own method before he had been led to connect it with the doctrine of forms.

At the end of the eleventh chapter Bacon proposes to give three cautions whereby we may ascertain whether what seems to be a direction really is one. The general principle is that the direction must carry you a degree or remove nearer to action, operation, or light; else it is but an abstract or varied notion. The first of the three particular cautions is "that the nature discovered be more original than the nature supposed, and not more secondary or of the like degree:" a remark which taken in conjunction with the illustrations by which it is followed, serves to confirm what I have elsewhere endeavoured to show, that Bacon's idea of natural philosophy was the explanation of the secondary qualities of bodies by means of the primary. The second caution is so obscurely expressed that I can only conjecture that it refers to the necessity of studying abstract qualities before commencing the study of concrete bodies. Composition subaltern and composition absolute are placed in antithesis to each other. The latter phrase apparently describes the synthesis of abstract natures by which an actual ultimate species is formed, and the former [refers] to the formation of a class of objects which all agree in possessing the nature which is the subject of inquiry. The fragment breaks off before the delivery of this second caution is completed, and we therefore know nothing of the third and last.

NOTE.

The manuscript from which Robert Stephens printed these fragments was found among some loose papers placed in his hands by the Earl of Oxford, and is now in the British Museum; Harl. MSS. 6462. It is a thin paper volume of the quarto size, written in the hand of one of Bacon's servants, with corrections, erasures, and interlineations in his own.

The chapters of which it consists are both imperfect in themselves (all but three),—some breaking off abruptly, others being little more than tables of contents,—and imperfect in their connexion with each other; so much so as to suggest the idea of a number of separate papers loosely put together. But it was not so (and the fact is important) that the volume itself was actually made up. However they came together, they are here fairly and consecutively copied out. Though it be a collection of fragments therefore, it is such a collection as Bacon thought worthy not only of being preserved, but of being transcribed into a volume; and a particular account of it will not be out of place.

The contents of the manuscript before Bacon touched it may be thus described.

1. A titlepage, on which is written "Valerius Terminus of the Interpretation of Nature, with the annotations of Hermes Stella."
2. "Chapter I. Of the limits and end of knowledge;" with a running title, "Of the Interpretation of Nature."
3. "The chapter immediately following the Inventory; being the 11th in order."
4. "A part of the 9th chapter, immediately precedent to the Inventory, and inducing the same."
5. "The Inventory, or an enumeration and view of inventions already discovered and in use, together with a note of the wants and the nature of the supplies; being the 10th chapter, and this a fragment only of the same."
6. Part of a chapter, not numbered, "Of the internal and profound errors and superstitions in the nature of the mind, and of the four sorts of Idols or fictions which offer themselves to the understanding in the inquisition of knowledge."

7. "Of the impediments of knowledge; being the third chapter, the preface only of it."
8. "Of the impediments which have been in the times and in diversion of wits; being the fourth chapter."
9. "Of the impediments of knowledge for want of a true succession of wits, and that hitherto the length of one man's life hath been the greatest measure of knowledge; being the fifth chapter."
10. "That the pretended succession of wits hath been evil placed, forasmuch as after variety of sects and opinions the most popular and not the truest prevaileth and weareth out the rest; being the sixth chapter."
11. "Of the impediments of knowledge in handling it by parts, and in slipping off particular sciences from the root and stock of universal knowledge; being the seventh chapter."
12. "That the end and scope of knowledge hath been generally mistaken, and that men were never well advised what it was they sought" (part of a chapter not numbered).
13. "An abridgment of divers chapters of the first book;" namely, the 12th, 13th, and 14th, (over which is a running title "Of active knowledge;") and (without any running title) the 15th, 16th, 17th, 18th, 19th, 21st, 22nd, 25th, and 26th. These abridgments have no headings; and at the end is written, "The end of the Abridgment of the first book of the Interpretation of Nature."

Such was the arrangement of the manuscript as the transcriber left it; which I have thought worth preserving, because I seem to see traces in it of two separate stages in the developement of the work; the order of the chapters as they are transcribed being probably the same in which Bacon wrote them; and the numbers inserted at the end of the headings indicating the order in which, when he placed them in the transcriber's hands, it was his intention to arrange them; and because it proves at any rate that at that time the design of the whole book was clearly laid out in his mind.

There is nothing, unfortunately, to fix the *date* of the transcript, unless it be implied in certain astronomical or astrological symbols written on the blank outside of the volume; in which the figures 1603 occur.[1] This may possibly be the transcriber's note of the

[1] See the second page of the facsimile at the beginning of this volume. The writing in the original is on the outside of the last leaf, which is in fact the cover. The front cover, if there ever was one, is lost. The ink with which the line containing the symbols is written corresponds with that in the body of the MS.; and the line itself is placed symmetrically in the middle of the page, near the top. The two lower

time when he finished his work; for which (but for one circumstance which I shall mention presently) I should think the year 1603 as likely a date as any; for we know from a letter of Bacon's, dated 3rd July 1603, that he had at that time resolved "to meddle as little as possible in the King's causes," and to "put his ambition wholly upon his pen;" and we know from the *Advancement of Learning* that in 1605 he was engaged upon a work entitled "The Interpretation of Nature:" to which I may add that there is in the Lambeth Library a copy of a letter from Bacon to Lord Kinlosse, dated 25th March, 1603, and written in the same hand as this manuscript.

Bacon's corrections, if I may judge from the character of the handwriting, were inserted a little later; for it is a fact that about the beginning of James's reign his writing underwent a remarkable

lines are apparently by another hand, probably of later date, certainly in ink of a different colour, and paler. The word "Philosophy" is in Bacon's own hand, written lightly in the upper corner at the left, and is no doubt merely a docket inserted afterwards when he was sorting his papers. What connexion there was between the note and the MS. it is impossible to say. But it is evidently a careful memorandum of something, set down by somebody when the MS. was at hand; and so many of the characters resemble those adopted to represent the planets and the signs of the zodiac, that one is led to suspect in it a note of the positions of the heavenly bodies at the time of some remarkable accident; — perhaps the plague, of which 30,578 persons died in London, during the year ending 22nd December, 1603. The period of the commencement, the duration, or the cessation of such an epidemic might naturally be so noted. Now three of the characters clearly represent respectively Mercury, Aquarius, and Sagittarius. The sign for Jupiter, as we find it in old books, is so like a 4, that the first figure of 45 may very well have been meant for it. The monogram at the beginning of the line bears a near resemblance to the sign of Capricorn in its most characteristic feature. And the mark over the sign of Aquarius appears to be an abbreviation of that which usually represents the Sun. (The blot between 1603 and B is nothing; being only meant to represent a figure 6 blotted out with the finger before the ink was dry.) Suspecting therefore that the writing contained a note of the positions of Mercury and Jupiter in the year 1603, I sent a copy to a scientific friend and asked him if from such data he could determine the month indicated. He found upon a rough calculation (taking account of mean motions only) that Jupiter did enter the sign of Sagittarius about the 10th of August, 1603, and continued there for about a twelvemonth; that the Sun entered Aquarius about the 12th or 13th of January, 1603–4; and that Mercury was about the 16th or 17th of the same month in the 26th or 27th degree of Capricorn: — coincidences which would have been almost conclusive as to the date indicated, if Capricorn had only stood where Aquarius does, and vice versâ. But their position as they actually stood in the MS. is a formidable, if not fatal, objection to the interpretation.

According to another opinion with which I have been favoured, the first monogram is a *nota bene*; the next group may mean *Dies Mercurii* (Wednesday) 26*th January*, 1603; and the rest refers to something not connected with astronomy. But to this also there is a serious objection. The 26th of January, 1603–4, was a Friday; and it seems to me very improbable that any Englishman would have described the preceding January as belonging to the year 1603. Bacon himself invariably dated according to the civil year, and the occasional use of the historical year in loose memoranda would have involved all his dates in confusion. I should think it more probable that the writer (who may have been copying a kind of notation with which he was not familiar) miscopied the sign of Venus into that of Mercury; in which case it would mean *Friday*, 26th January, 1603–4. But even then the explanation would be unsatisfactory, as leaving so much unexplained. Those however who are familiar with old MSS. relating to such subjects may probably be able to interpret the whole.

change, from the hurried Saxon hand full of large sweeping curves and with letters imperfectly formed and connected, which he wrote in Elizabeth's time, to a small, neat, light, and compact one, formed more upon the Italian model which was then coming into fashion; and when these corrections were made it is evident that this new character had become natural to him and easy. It is of course impossible to fix the precise date of such a change, — the more so because his autographs of this period are very scarce, — but whenever it was that he corrected this manuscript, it is evident that he then considered it worthy of careful revision. He has not merely inserted a sentence here and there, altered the numbers of the chapters, and added words to the headings in order to make the description more exact; but he has taken the trouble to add the running title wherever it was wanting, thus writing the words "of the Interpretation of Nature" at full length not less than eighteen times over; and upon the blank space of the titlepage he has written out a complete table of contents.[1] In short, if he had been preparing the manuscript for the press or for a fresh transcript, he could not have done it more completely or carefully, — only that he has given no directions for altering the order of the chapters so as to make it correspond with the numbers. And hence I infer that up to the time when he made these corrections, this was the form of the great work on which he was engaged: it was a work concerning the Interpretation of Nature; which was to begin where the *Novum Organum* begins; and of which the first book was to include all the preliminary considerations preparatory to the exposition of the formula.

I place this fragment here in deference to Mr. Ellis's decided opinion that it was written before the *Advancement of Learning*. The positive ground indeed which he alleges in support of that conclusion I am obliged to set aside, as founded, I think, upon a misapprehension; and the supposition that no part of it was written later involves a difficulty which I cannot yet get over to my own satisfaction. But that the body of it was written earlier I see no reason to doubt; and if so, this is its proper place.

The particular point on which I venture to disagree with Mr. Ellis I have stated in a note upon his preface to the *Novum Organum*, promising at the same time a fuller explanation of the grounds of my own conclusion, which I will now give.

The question is, whether the "Inventory" in the 10th chapter of *Valerius Terminus* was to have exhibited a general survey of the state of knowledge corresponding with that which fills the second book of the *Advancement of Learning*. I think not.

[1] See the facsimile. I am inclined to think that there was an interval between the writing of the first eleven titles and the last two; during which the Italian character had become more familiar to him.

It is true indeed that the title of that 10th chapter,—namely, "The Inventory, or an enumeration and view of inventions already discovered and in use, with a note of the wants and the nature of the supplies,—has at first sight a considerable resemblance to the description of the contents of the second book of the *Advancement of Learning*,—namely, "A general and faithful perambulation of learning, with an inquiry what parts thereof lie fresh and waste, and not improved and converted by the industry of Man; . . . . wherein nevertheless my purpose is at this time to note only omissions and deficiencies, and not to make any redargutions of errors," and so on. But an "enumeration of *Inventions*" is not the same thing as "a perambulation of *Learning;*" and it will be found upon closer examination that the "Inventory" spoken of in *Valerius Terminus* does really correspond to one, and one only, of the fifty-one *Desiderata* set down at the end of the *De Augmentis;* viz. that *Inventarium opum humanarum*, which was to be an appendix to the *Magia naturalis*. See *De Aug.* iii. 5. This will appear clearly by comparing the descriptions of the two.

In the *Advancement of Learning* Bacon tells us that there are two points of much purpose pertaining to the department of Natural Magic: the first of which is, "That there be made a calendar resembling an Inventory of the *estate of man*, containing *all the Inventions, being the works or fruits of nature or art*, which are now extant *and of which man is already possessed;* out of which doth naturally result a note what things are yet held impossible or not invented; which calendar will be the more artificial and serviceable if to every reputed impossibility you add what thing is extant which cometh the nearest in degree to that impossibility: to the end that by these optatives and essentials man's inquiry may be the more awake in deducing direction of works from the speculation of causes."

The Inventory which was to have been inserted in the 10th chapter of *Valerius Terminus* is thus introduced:—"The plainest method and most directly pertinent to this intention will be to make distribution of *sciences, arts, inventions, works*, and their portions, *according to the use and tribute which they yield and render to the condition of man's life;* and under those several uses, being as several offices of provisions, to charge and tax what may be reasonably exacted or demanded, ... and then upon those charges and taxations to distinguish and present as it were in several columns *what is extant and already found*, and what is *defective and further to be provided.* Of which provisions because in many of them, after the manner of slothful and faulty accomptants, it will be returned by way of excuse that no such are to be had, it will be fit

to give some light *of the nature of the supplies;* whereby it will evidently appear that they are to be compassed and procured." And that the calendar was to deal, not with knowledge in general, but only with arts and sciences of *invention* in its more restricted sense —the *pars operativa de natura* (*De Aug.* iii. 5.)—appears no less clearly from the opening of the 11th chapter, which was designed immediately to follow the "Inventory." "It appeareth then what is now in proposition, not by general circumlocution but by particular note. No former philosophy," &c. &c. "but the revealing and discovering of *new inventions and operations*, ... the nature and kinds of which inventions *have been described* as they could be discovered," &c. If further evidence were required of the exact resemblance between the Inventory of *Valerius Terminus* and the Inventarium of the *Advancement* and the *De Augmentis*, I might quote the end of the 9th chapter, where the particular expressions correspond, if possible, more closely still. But I presume that the passages which I have given are enough; and that the opinion which I have elsewhere expressed as to the origin of the *Advancement of Learning*,—namely, that the writing of it was a by-thought and no part of the work on the Interpretation of Nature as originally designed,—will not be considered inconsistent with the evidence afforded by these fragments.

That the *Valerius Terminus* was composed before the *Advancement*, though a conclusion not deducible from the Inventory, is nevertheless probable: but to suppose that it was so composed *exactly in its present form*, involves, as I said, a difficulty; which I will now state. The point is interesting, as bearing directly upon the developement in Bacon's mind of the doctrine of Idols; concerning which see preface to *Novum Organum*, note C. But I have to deal with it here merely as bearing upon the probable date of this fragment.

In treating of the department of Logic in the *Advancement*, Bacon notices as altogether wanting "the particular elenches or cautions against *three* false appearances" or fallacies by which the mind of man is beset: the "caution" of which, he says, "doth extremely import the true conduct of human judgment." These false appearances he describes, though he does not give their names; and they correspond respectively to what he afterwards called the Idols of the Tribe, the Cave, and the Forum. But he makes no mention of the fourth; namely, the Idols of the Theatre. Now in *Valerius Terminus* we find two separate passages in which the Idols are mentioned; and in both all four are enumerated, and all by name; though what he afterwards called Idols of the Forum, he there calls Idols of the Palace; and it seems to me very unlikely that, if when

he wrote the *Advancement* he had already formed that classification he should have omitted all mention of the Idols of the Theatre; for though it is true that that was not the place to discuss them, and therefore in the corresponding passage of the *De Augmentis* they are noticed as to be passed by "for the present," yet they *are* noticed by name, and in all Bacon's later writings the confutation of them holds a very prominent place.

To me the most probable explanation of the fact is this. I have already shown that between the composition and the transcription of these fragments the design of the work appears to have undergone a considerable change; the order of the chapters being entirely altered. We have only to suppose therefore that they were composed before the *Advancement* and transcribed after, and that n preparing them for the transcriber Bacon made the same kind of alterations in the originals which he afterwards made upon the transcript, and the difficulty disappears. Nothing would be easier than to correct "three" into "four," and insert "the Idols of the Theatre" at the end of the sentence.

And this reminds me (since I shall have so much to do with these questions of date) to suggest a general caution with regard to them all; namely, that in the case of fragments like these, the comparison of isolated passages can hardly ever be relied upon for evidence of the date or order of composition, or of the progressive developement of the writer's views; and for this simple reason,— we can never be sure that the passages as they now stand formed part of the original writing. The copy of the fragment which we have may be (as there is reason to believe this was) a transcript from several loose papers, written at different periods and containing alterations or additions made from time to time. We may know perhaps that when Bacon published the *Advancement of Learning* he was ignorant of some fact with which he afterwards became acquainted; we may find in one of these fragments, — say the *Temporis Partus Masculus*,— a passage implying acquaintance with that fact. Does it follow that the *Temporis Partus Masculus* was written after the *Advancement of Learning?* No; for in looking over the manuscript long after it was written, he may have observed and corrected the error. And we cannot conclude that he at the same time altered the whole composition so as to bring it into accordance with the views he then held; for that might be too long a work. He may have inserted a particular correction, but meant to rewrite the whole; and if so, in spite of the later date indicated by that particular passage, the body of the work would still represent a stage in his opinions anterior to the *Advancement of Learning.*

I have felt some doubt whether in printing this fragment, I should follow the example of Stephens, who gave it exactly as he found

it; or that of later editors, who have altered the order of the chapters so as to make it agree with the numbers. The latter plan will perhaps, upon the whole, be the more convenient. There can be little doubt that the numbers of the chapters indicate the order in which Bacon meant them to be read; and if any one wishes to compare it with the order in which they seem to have been written, he has only to look at Bacon's table of contents, which was made with reference to the transcript, and which I give unaltered, except as to the spelling.

The notes to this piece are mine. — *J. S.*

VALERIUS TERMINUS

OF

THE INTERPRETATION OF NATURE:

WITH THE

ANNOTATIONS OF HERMES STELLA.[1]

A few fragments of the first book, viz.

1. The first chapter entire. [Of the ends and limits of knowledge.]
2. A portion of the 11th chapter. [Of the scale.]
3. A small portion of the 9th chapter [being an Inducement to the Inventory.]
4. A small portion of the 10th chapter [being the preface to the Inventory.]
5. A small portion of the 16th chapter [being a preface to the inward elenches of the mind.]
6. A small portion of the 4th chapter. [Of the impediments of knowledge in general.]
7. A small portion of the 5th chapter.] Of the diversion of wits.]

[1] This is written in the transcriber's hand: all that follows in Bacon's. The words between brackets have a line drawn through them. For an exact facsimile of the whole, made by Mr. Netherclift, see the beginning of the volume.

8. The 6th chapter entire. [Of]

9. A portion of the 7th chapter.

10. The 8th chapter entire.

11. Another portion of the 9th chapter.

12. The Abridgment of the 12. 13. 14. 15. 16. 17. 18. 19. 21. 22. 25. 26th chapters of the first book.

13. The first chapter of [the] a book of the same argument written in Latin and destined [for] to be [traditionary] separate and not public.[1]

None of the Annotations of Stella are set down in these fragments.

[1] This refers to the first chapter of the *Temporis Partus Masculus;* which follows in the MS. volume, but not here. It is important as bearing upon the date of that fragment.

OF

THE INTERPRETATION OF NATURE.

Cap. 1.

Of the limits and end of knowledge.

In the divine nature both religion and philosophy hath acknowledged goodness in perfection, science or providence comprehending all things, and absolute sovereignty or kingdom. In aspiring to the throne of power the angels transgressed and fell, in presuming to come within the oracle of knowledge man transgressed and fell[1]; but in pursuit towards the similitude of God's goodness or love (which is one thing, for love is nothing else but goodness put in motion or applied) neither man or spirit ever hath transgressed, or shall transgress.

The angel of light that was, when he presumed before his fall, said within himself, *I will ascend and be like unto the Highest;* not God, but the highest. To be like to God in goodness, was no part of his emulation; knowledge, being in creation an angel of light, was not the want which did most solicit him; only because he was a minister he aimed at a supremacy; therefore his climbing or ascension was turned into a throwing down or precipitation.

Man on the other side, when he was tempted before he fell, had offered unto him this suggestion, *that he should be like unto God.* But how? Not simply, but in this part, *knowing good and evil.* For being in his creation invested with sovereignty of all inferior creatures, he was not needy of power or dominion; but again, being a spirit newly inclosed in a body of earth, he was fittest to be allured with appetite of light and liberty of knowledge; therefore this approaching and intruding into God's secrets and mysteries was rewarded with a further removing and estranging from God's presence. But as to the goodness

[1] This clause is repeated in the margin, in the transcriber's hand.

of God, there is no danger in contending or advancing towards a similitude thereof, as that which is open and propounded to our imitation. For that voice (whereof the heathen and all other errors of religion have ever confessed that it sounds not like man), *Love your enemies; be you like unto your heavenly Father, that suffereth his rain to fall both upon the just and the unjust,* doth well declare, that we can in that point commit no excess; so again we find it often repeated in the old law, *Be you holy as I am holy;* and what is holiness else but goodness, as we consider it separate and guarded from all mixture and all access of evil?

Wherefore seeing that knowledge is of the number of those things which are to be accepted of with caution and distinction; being now to open a fountain, such as it is not easy to discern where the issues and streams thereof will take and fall; I thought it good and necessary in the first place to make a strong and sound head or bank to rule and guide the course of the waters; by setting down this position or firmament, namely, *That all knowledge is to be limited by religion, and to be referred to use and action.*

For if any man shall think by view and inquiry into these sensible and material things, to attain to any light for the revealing of the nature or will of God, he shall dangerously abuse himself. It is true that the contemplation of the creatures of God hath for end (as to the natures of the creatures themselves) knowledge, but as to the nature of God, no knowledge, but wonder; which is nothing else but contemplation broken off, or losing itself. Nay further, as it was aptly said by one of Plato's school *the sense of man resembles the sun, which openeth and revealeth the terrestrial globe, but obscureth and concealeth the celestial;* so doth the sense discover natural things, but darken and shut up divine. And this appeareth sufficiently in that there is no proceeding in invention of knowledge but by similitude; and God is only self-like, having nothing in common with any creature, otherwise than as in shadow and trope. Therefore attend his will as himself openeth it, and give unto faith that which unto faith belongeth; for more worthy it is to believe than to think or know, considering that in knowledge (as we now are capable of it) the mind suffereth from inferior natures; but in all belief it suffereth from a spirit which it holdeth superior and more authorised than itself.

To conclude, the prejudice hath been infinite that both divine and human knowledge hath received by the intermingling and tempering of the one with the other; as that which hath filled the one full of heresies, and the other full of speculative fictions and vanities.

But now there are again which in a contrary extremity to those which give to contemplation an over-large scope, do offer too great a restraint to natural and lawful knowledge, being unjustly jealous that every reach and depth of knowledge wherewith their conceits have not been acquainted, should be too high an elevation of man's wit, and a searching and ravelling too far into God's secrets; an opinion that ariseth either of envy (which is proud weakness and to be censured and not confuted), or else of a deceitful simplicity. For if they mean that the ignorance of a second cause doth make men more devoutly to depend upon the providence of God, as supposing the effects to come immediately from his hand, I demand of them, as Job demanded of his friends, *Will you lie for God as man will for man to gratify him?* But if any man without any sinister humour doth indeed make doubt that this digging further and further into the mine of natural knowledge is a thing without example and uncommended in the Scriptures, or fruitless; let him remember and be instructed; for behold it was not that pure light of natural knowledge, whereby man in paradise was able to give unto every living creature a name according to his propriety, which gave occasion to the fall; but it was an aspiring desire to attain to that part of moral knowledge which defineth of good and evil, whereby to dispute God's commandments and not to depend upon the revelation of his will, which was the original temptation. And the first holy records, which within those brief memorials of things which passed before the flood entered few things as worthy to be registered but only lineages[1] and propagations, yet nevertheless honour the remembrance of the inventor both of music and works in metal. Moses again (who was the reporter) is said to have been seen in all the Egyptian learning, which nation was early and leading in matter of knowledge. And Salomon the king, as out of a branch of his wisdom extraordinarily petitioned and granted from God, is said to have

[1] *linages* in original. See note 3. p. 148.

written a natural history of all that is green from the cedar to the moss, (which is but a rudiment between putrefaction and an herb,) and also of all that liveth and moveth. And if the book of Job be turned over, it will be found to have much aspersion of natural philosophy. Nay, the same Salomon the king affirmeth directly that the glory of God *is to conceal a thing, but the glory of the king is to find it out*, as if according to the innocent play of children the divine Majesty took delight to hide his works, to the end to have them found out; for in naming the king he intendeth man, taking such a condition of man as hath most excellency and greatest commandment of wits and means, alluding also to his own person, being truly one of those clearest burning lamps, whereof himself speaketh in another place, when he saith *The spirit of man is as the lamp of God, wherewith he searcheth all inwardness;* which nature of the soul the same Salomon holding precious and inestimable, and therein conspiring with the affection of Socrates who scorned the pretended learned men of his time for raising great benefit of their learning (whereas Anaxagoras contrariwise and divers others being born to ample patrimonies decayed them in contemplation), delivereth it in precept yet remaining, *Buy the truth, and sell it not; and so of wisdom and knowledge.*

And lest any man should retain a scruple as if this thirst of knowledge were rather an humour of the mind than an emptiness or want in nature and an instinct from God, the same author defineth of it fully, saying, *God hath made every thing in beauty according to season; also he hath set the world in man's heart, yet can he not find out the work which God worketh from the beginning to the end:* declaring not obscurely that God hath framed the mind of man as a glass capable of the image of the universal world, joying to receive the signature thereof as the eye is of light, yea not only satisfied in beholding the variety of things and vicissitude of times, but raised also to find out and discern those ordinances and decrees which throughout all these changes are infallibly observed. And although the highest generality of motion or summary law of nature God should still reserve within his own curtain, yet many and noble are the inferior and secondary operations which are within man's sounding. This is a thing which I cannot tell whether I may so plainly speak as truly conceive, that as all knowledge appeareth to be a plant of God's own planting, so it may seem the spreading

and flourishing or at least the bearing and fructifying of this plant, by a providence of God, nay not only by a general providence but by a special prophecy, was appointed to this autumn of the world: for to my understanding it is not violent to the letter, and safe now after the event, so to interpret that place in the prophecy of Daniel where speaking of the latter times it is said, *Many shall pass to and fro, and science shall be increased;* as if the opening of the world by navigation and commerce and the further discovery of knowledge should meet in one time or age.

But howsoever that be, there are besides the authorities of Scriptures before recited, two reasons of exceeding great weight and force why religion should dearly protect all increase of natural knowledge: the one, because it leadeth to the greater exaltation of the glory of God; for as the Psalms and other Scriptures do often invite us to consider and to magnify the great and wonderful works of God, so if we should rest only in the contemplation of those shews which first offer themselves to our senses, we should do a like injury to the majesty of God, as if we should judge of the store of some excellent jeweller by that only which is set out to the street in his shop. The other reason is, because it is a singular help and a preservative against unbelief and error; for, saith our Saviour, *You err, not knowing the Scriptures nor the power of God;* laying before us two books or volumes to study if we will be secured from error; first the Scriptures revealing the will of God, and then the creatures expressing his power; for that latter book will certify us that nothing which the first teacheth shall be thought impossible. And most sure it is, and a true conclusion of experience, that a little natural philosophy inclineth the mind to atheism, but a further proceeding bringeth the mind back to religion.

To conclude then, let no man presume to check the liberality of God's gifts, who, as was said, *hath set the world in man's heart.* So as whatsoever is not God but parcel of the world, he hath fitted it to the comprehension of man's mind, if man will open and dilate the powers of his understanding as he may.

But yet evermore it must be remembered that the least part of knowledge passed to man by this so large a charter from God must be subject to that use for which God hath granted it;

which is the benefit and relief of the state and society of man; for otherwise all manner of knowledge becometh malign and serpentine, and therefore as carrying the quality of the serpent's sting and malice it maketh the mind of man to swell; as the Scripture saith excellently, *knowledge bloweth up, but charity buildeth up.* And again the same author doth notably disavow both power and knowledge such as is not dedicated to goodness or love, for saith he, *If I have all faith so as I could remove mountains,* (there is power active,) *if I render my body to the fire,* (there is power passive,) *if I speak with the tongues of men and angels,* (there is knowledge, for language is but the conveyance of knowledge,) *all were nothing.*

And therefore it is not the pleasure of curiosity, nor the quiet of resolution, nor the raising of the spirit, nor victory of wit, nor faculty of speech, nor lucre of profession, nor ambition of honour or fame, nor inablement for business, that are the true ends of knowledge; some of these being more worthy than other, though all inferior and degenerate: but it is a restitution and reinvesting (in great part) of man to the sovereignty and power (for whensoever he shall be able to call the creatures by their true names he shall again command them) which he had in his first state of creation. And to speak plainly and clearly, it is a discovery of all operations and possibilities of operations from immortality (if it were possible) to the meanest mechanical practice. And therefore knowledge that tendeth but to satisfaction is but as a courtesan, which is for pleasure and not for fruit or generation. And knowledge that tendeth to profit or profession or glory is but as the golden ball thrown before Atalanta, which while she goeth aside and stoopeth to take up she hindereth the race. And knowledge referred to some particular point of use is but as Harmodius which putteth down one tyrant, and not like Hercules who did perambulate the world to suppress tyrants and giants and monsters in every part.[1] It is true, that in two points the curse is peremptory and not to be removed; the one that vanity must be the end in all human effects, eternity being resumed, though the revolutions and periods may be delayed. The other that the consent of the creature being now turned into reluctation, this power cannot otherwise be exercised and administered but

[1] The words "that is, man's miseries and necessities," which followed in the transcript, have a line drawn through them.

with labour, as well in inventing as in executing; yet nevertheless chiefly that labour and travel which is described by the sweat of the brows more than of the body; that is such travel as is joined with the working and discursion of the spirits in the brain: for as Salomon saith excellently, *The fool putteth to more strength, but the wise man considereth which way,* signifying the election of the mean to be more material than the multiplication of endeavour. It is true also that there is a limitation rather potential than actual, which is when the effect is possible, but the time or place yieldeth not the matter or basis whereupon man should work. But notwithstanding these precincts and bounds, let it be believed, and appeal thereof made to *Time,* (with renunciation nevertheless to all the vain and abusing promises of Alchemists and Magicians, and such like light, idle, ignorant, credulous, and fantastical wits and sects,) that the new-found world of land was not greater addition to the ancient continent than there remaineth at this day a world of inventions and sciences unknown, having respect to those that are known, with this difference, that the ancient regions of knowledge will seem as barbarous compared with the new, as the new regions of people seem barbarous compared to many of the old.

The dignity of this end (of endowment of man's life with new commodities) appeareth by the estimation that antiquity made of such as guided thereunto. For whereas founders of states, lawgivers, extirpers of tyrants, fathers of the people, were honoured but with the titles of Worthies or Demigods, inventors were ever consecrated amongst the Gods themselves. And if the ordinary ambitions of men lead them to seek the amplification of their own power in their countries, and a better ambition than that hath moved men to seek the amplification of the power of their own countries amongst other nations, better again and more worthy must that aspiring be which seeketh the amplification of the power and kingdom of mankind over the world; the rather because the other two prosecutions are ever culpable of much perturbation and injustice; but this is a work truly divine, which cometh *in aura leni* without noise or observation.

The access also to this work hath been by that port or passage, which the divine Majesty (who is unchangeable in his ways) doth infallibly continue and observe; that is the

felicity wherewith he hath blessed an humility of mind, such as rather laboureth to spell and so by degrees to read in the volumes of his creatures, than to solicit and urge and as it were to invocate a man's own spirit to divine and give oracles unto him. For as in the inquiry of divine truth, the pride of man hath ever inclined to leave the oracles of God's word and to vanish in the mixture of their own inventions; so in the self-same manner, in inquisition of nature they have ever left the oracles of God's works, and adored the deceiving and deformed imagery which the unequal mirrors of their own minds have represented unto them. Nay it is a point fit and necessary in the front and beginning of this work without hesitation or reservation to be professed, that it is no less true in this human kingdom of knowledge than in God's kingdom of heaven, that no man shall enter into it *except he become first as a little child.*[1]

Of the impediments of knowledge, being the 4*th*[2] *chapter, the preface only of it.*

In some things it is more hard to attempt than to achieve, which falleth out when the difficulty is not so much in the matter or subject, as it is in the crossness and indisposition of the mind of man to think of any such thing, to will or to resolve it. And therefore Titus Livius in his declamatory digression wherein he doth depress and extenuate the honour of Alexander's conquests saith, *Nihil aliud quam bene ausus vana contemnere:* in which sort of things it is the manner of men first to wonder that any such thing should be possible, and after it is found out to wonder again how the world should miss it so long. Of this nature I take to be the invention and discovery of knowledge, &c.

The impediments which have been in the times, and in diversion of wits, being the 5*th chapter*[3], a small fragment in the beginning of that chapter.

The encounters of the times have been nothing favourable and prosperous for the invention of knowledge; so as it is not

[1] This chapter ends at the top of a new page. The rest is left blank.

[2] The word "third" has a line drawn through it, and 4th is written over it in Bacon's hand.

[3] Originally "being the fourth chapter the beginning:" the correction all in Bacon's hand.

only the daintiness of the seed to take, and the ill mixture and unliking of the ground to nourish or raise this plant, but the ill season also of the weather by which it hath been checked and blasted. Especially in that the seasons have been proper to bring up and set forward other more hasty and indifferent plants, whereby this of knowledge hath been starved and overgrown; for in the descent of times always there hath been somewhat else in reign and reputation, which hath generally aliened and diverted wits and labours from that employment.

For as for the uttermost antiquity which is like fame that muffles her head and tells tales, I cannot presume much of it; for I would not willingly imitate the manner of those that describe maps, which when they come to some far countries whereof they have no knowledge, set down how there be great wastes and deserts there: so I am not apt to affirm that they knew little, because what they knew is little known to us. But if you will judge of them by the last traces that remain to us, you will conclude, though not so scornfully as Aristotle doth, that saith our ancestors were extreme gross, as those that came newly from being moulded out of the clay or some earthly substance; yet reasonably and probably thus, that it was with them in matter of knowledge but as the dawning or break of day. For at that time the world was altogether home-bred, every nation looked little beyond their own confines or territories, and the world had no through lights then, as it hath had since by commerce and navigation, whereby there could neither be that contribution of wits one to help another, nor that variety of particulars for the correcting of customary conceits.

And as there could be no great collection of wits of several parts or nations, so neither could there be any succession of wits of several times, whereby one might refine the other, in regard they had not history to any purpose. And the manner of their traditions was utterly unfit and unproper for amplification of knowledge. And again the studies of those times, you shall find, besides wars, incursions, and rapines, which were then almost every where betwixt states adjoining (the use of leagues and confederacies being not then known), were to populate by multitude of wives and generation, a thing at this day in the waster part of the West-Indies principally affected;

and to build sometimes for habitation towns and cities, sometimes for fame and memory monuments, pyramids, colosses, and the like. And if there happened to rise up any more civil wits[1]; then would he found and erect some new laws, customs, and usages, such as now of late years, when the world was revolute almost to the like rudeness and obscurity, we see both in our own nation and abroad many examples of, as well in a number of tenures reserved upon men's lands, as in divers customs of towns and manors, being the devices that such wits wrought upon in such times of deep ignorance, &c.[2]

The impediments of knowledge for want of a true succession of wits, and that hitherto the length of one man's life hath been the greatest measure of knowledge, being the 6th chapter, the whole chapter.[3]

In arts mechanical the first device comes shortest and time addeth and perfecteth. But in sciences of conceit the first author goeth furthest and time leeseth and corrupteth. Painting, artillery, sailing, and the like, grossly managed at first, by time accommodate and refined. The philosophies and sciences of Aristotle, Plato, Democritus, Hippocrates, of most vigour at first, by time degenerated and imbased. In the former many wits and industries contributed in one: In the latter many men's wits spent to deprave the wit of one.

The error is both in the deliverer and in the receiver. He that delivereth knowledge desireth to deliver it in such form as may be soonest believed, and not as may be easiliest examined. He that receiveth knowledge desireth rather present satisfaction than expectant search, and so rather not to doubt than not to err. Glory maketh the author not to lay open his weakness, and sloth maketh the disciple not to know his strength.

Then begin men to aspire to the second prizes; to be a profound interpreter and commenter, to be a sharp champion and defender, to be a methodical compounder and abridger. And this is the unfortunate succession of wits which the world hath yet had, whereby the patrimony of all knowledge goeth not

[1] *witts* in MS. Probably a mistake for *witte*.
[2] The "&c." in Bacon's hand.
[3] Originally "the fifth chapter:" "6th" substituted, and "the whole chapter" added, in Bacon's hand.

on husbanded or improved, but wasted and decayed. For knowledge is like a water that will never arise again higher than the level from which it fell; and therefore to go beyond Aristotle by the light of Aristotle is to think that a borrowed light can increase the original light from whom it is taken. So then no true succession of wits having been in the world, either we must conclude that knowledge is but a task for one man's life, and then vain was the complaint that *life is short, and art is long:* or else, that the knowledge that now is, is but a shrub, and not that tree which is never dangerous, but where it is to the purpose of knowing Good and Evil; which desire ever riseth upon an appetite to elect and not to obey, and so containeth in it a manifest defection.

That the pretended succession of wits hath been evil placed, forasmuch as after variety of sects and opinions, the most popular and not the truest prevaileth and weareth out the rest; being the 7th chapter; a fragment.[1]

It is sensible to think that when men enter first into search and inquiry, according to the several frames and compositions of their understanding they light upon different conceits, and so all opinions and doubts are beaten over, and then men having made a taste of all wax weary of variety, and so reject the worst and hold themselves to the best, either some one if it be eminent, or some two or three if they be in some equality, which afterwards are received and carried on, and the rest extinct.

But truth is contrary, and that time is like a river which carrieth down things which are light and blown up, and sinketh and drowneth that which is sad and weighty. For howsoever governments have several forms, sometimes one governing, sometimes few, sometimes the multitude; yet the state of knowledge is ever a *Democratie,* and that prevaileth which is most agreeable to the senses and conceits of people. As for example there is no great doubt but he that did put the beginnings of things to be *solid, void, and motion to the centre,* was in better earnest than he that put *matter, form, and shift;* or he that put *the mind, motion, and matter.* For no man shall

[1] Originally "the sixth chapter:" "7th" substituted, and "a fragment" added in Bacon's hand.

enter into inquisition of nature, but shall pass by that opinion of Democritus, whereas he shall never come near the other two opinions, but leave them aloof for the schools and table-talk. Yet those of Aristotle and Plato, because they be both agreeable to popular sense, and the one was uttered with subtilty and the spirit of contradiction, and the other with a stile of ornament and majesty, did hold out, and the other gave place, &c.[1]

Of the impediments of knowledge in handling it by parts, and in slipping off particular sciences from the root and stock of universal knowledge, being the 8*th*[2] *chapter*, the whole chapter.

Cicero, the orator, willing to magnify his own profession, and thereupon spending many words to maintain that eloquence was not a shop of good words and elegancies but a treasury and receipt of all knowledges, so far forth as may appertain to the handling and moving of the minds and affections of men by speech, maketh great complaint of the school of Socrates; that whereas before his time the same professors of wisdom in Greece did pretend to teach an universal *Sapience* and knowledge both of matter and words, Socrates divorced them and withdrew philosophy and left rhetoric to itself, which by that destitution became but a barren and unnoble science. And in particular sciences we see that if men fall to subdivide their labours, as to be an oculist in physic, or to be perfect in some one title of the law, or the like, they may prove ready and subtile, but not deep or sufficient, no not in that subject which they do particularly attend, because of that consent which it hath with the rest. And it is a matter of common discourse of the chain of sciences how they are linked together, insomuch as the Grecians, who had terms at will, have fitted it of a name of *Circle Learning*. Nevertheless I that hold it for a great impediment towards the advancement and further invention of knowledge, that particular arts and sciences have been disincorporated from general knowledge, do not understand one and the same thing which Cicero's discourse and the note and conceit of the Grecians in their word *Circle Learning* do intend.

[1] The "&c." in Bacon's hand.

[2] Originally "seventh;" "8th" substituted, and "the whole chapter" added, in Bacon's hand.

For I mean not that use which one science hath of another for ornament or help in practice, as the orator hath of knowledge of affections for moving, or as military science may have use of geometry for fortifications; but I mean it directly of that use by way of supply of light and information which the particulars and instances of one science do yield and present for the framing or correcting of the axioms of another science in their very truth and notion. And therefore that example of *oculists* and *title lawyers* doth come nearer my conceit than the other two; for sciences distinguished have a dependence upon universal knowledge to be augmented and rectified by the superior light thereof, as well as the parts and members of a science have upon the *Maxims* of the same science, and the mutual light and consent which one part receiveth of another. And therefore the opinion of Copernicus in astronomy, which astronomy itself cannot correct because it is not repugnant to any of the appearances, yet natural philosophy doth correct. On the other side if some of the ancient philosophers had been perfect in the observations of astronomy, and had called them to counsel when they made their principles and first axioms, they would never have divided their philosophy as the Cosmographers do their descriptions by globes, making one philosophy for heaven and another for under heaven, as in effect they do.

So if the moral philosophers that have spent such an infinite quantity of debate touching Good and the highest good, had cast their eye abroad upon nature and beheld the appetite that is in all things to receive and to give; the one motion affecting preservation and the other multiplication; which appetites are most evidently seen in living creatures in the pleasure of nourishment and generation; and in man do make the aptest and most natural division of all his desires, being either of sense of pleasure or sense of power; and in the universal frame of the world are figured, the one in the beams of heaven which issue forth, and the other in the lap of the earth which takes in: and again if they had observed the motion of congruity or situation of the parts in respect of the whole, evident in so many particulars; and lastly if they had considered the motion (familiar in attraction of things) to approach to that which is higher in the same kind; when by these observations so easy and concurring in natural philosophy, they should have found

out this quaternion of good, in enjoying or fruition, effecting or operation, consenting or proportion, and approach or assumption; they would have saved and abridged much of their long and wandering discourses of pleasure, virtue, duty, and religion. So likewise in this same logic and rhetoric, or arts[1] of argument and grace of speech, if the great masters of them would but have gone a form lower, and looked but into the observations of Grammar concerning the kinds of words, their derivations, deflexions, and syntax; specially enriching the same with the helps of several languages, with their differing proprieties of words, phrases, and tropes; they might have found out more and better footsteps of common reason, help of disputation, and advantages of cavillation, than many of these which they have propounded. So again a man should be thought to dally, if he did note how the figures of rhetoric and music are many of them the same. The repetitions and traductions in speech and the reports and hauntings of sounds in music are the very same things. Plutarch hath almost made a book of the Lacedæmonian kind of jesting, which joined ever pleasure with distaste. *Sir*, (saith a man of art to Philip king of Macedon when he controlled him in his faculty,) *God forbid your fortune should be such as to know these things better than I.* In taxing his ignorance in his art he represented to him the perpetual greatness of his fortune, leaving him no vacant time for so mean a skill. Now in music it is one of the ordinariest flowers to fall from a discord or hard tune upon a sweet accord. The figure that Cicero and the rest commend as one of the best points of elegancy, which is the fine checking of expectation, is no less well known to the musicians when they have a special grace in flying the close or cadence. And these are no allusions but direct communities, the same delights of the mind being to be found not only in music, rhetoric, but in moral philosophy, policy, and other knowledges, and that obscure in the one, which is more apparent in the other, yea and that discovered in the one which is not found at all in the other, and so one science greatly aiding to the invention and augmentation of another. And therefore without this intercourse the axioms of sciences will fall out to be neither full nor true; but will be such opinions as Aristotle in some places doth wisely censure,

[1] *acts* in MS., I think.

when he saith *These are the opinions of persons that have respect but to a few things.* So then we see that this note leadeth us to an administration of knowledge in some such order and policy as the king of Spain in regard of his great dominions useth in state; who though he hath particular councils for several countries and affairs, yet hath one council of State or last resort, that receiveth the advertisements and certificates from all the rest. Hitherto of the diversion, succession, and conference of wits.

That the end and scope of knowledge hath been generally mistaken, and that men were never well advised what it was they sought; being the 9th chapter, whereof a fragment (which is the end of the same chapter) is before.[1]

It appeareth then how rarely the wits and labours of men have been converted to the severe and original inquisition of knowledge; and in those who have pretended, what hurt hath been done by the affectation of professors and the distraction of such as were no professors[2]; and how there was never in effect any conjunction or combination of wits in the first and inducing search, but that every man wrought apart, and would either have his own way or else would go no further than his guide, having in the one case the honour of a first, and in the other the ease of a second; and lastly how in the descent and continuance of wits and labours the succession hath been in the most popular and weak opinions, like unto the weakest natures which many times have most children, and in them also the condition of succession hath been rather to defend and to adorn than to add; and if to add, yet that addition to be rather a refining of a part than an increase of the whole. But the impediments of time and accidents, though they have wrought a general indisposition, yet are they not so peremptory and binding as the internal impediments and clouds in the mind and spirit of man, whereof it now followeth to speak.

The Scripture speaking of the worst sort of error saith, *Errare fecit eos in invio et non in via.* For a man may wander

[1] See p. 231. note 1.; and compare Table of Contents (p. 213.) No. 3.
The number of this chapter was not stated in the transcript as it originally stood: the words in Roman characters are all added in Bacon's hand, at the end of the title: nothing is struck out.

[2] This clause is repeated in the margin and marked for insertion in its proper place.

in the way, by rounding up and down. But if men have failed in their very direction and address that error will never by good fortune correct itself. Now it hath fared with men in their contemplations as Seneca saith it fareth with them in their actions, *De partibus vitæ quisque deliberat, de summa nemo.* A course very ordinary with men who receive for the most part their final ends from the inclination of their nature, or from common example and opinion, never questioning or examining them, nor reducing them to any clear certainty; and use only to call themselves to account and deliberation touching the means and second ends, and thereby set themselves in the right way to the wrong place. So likewise upon the natural curiosity and desire to know, they have put themselves in way without foresight or consideration of their journey's end.

For I find that even those that have sought knowledge for itself, and not for benefit or ostentation or any practical enablement in the course of their life, have nevertheless propounded to themselves a wrong mark, namely satisfaction (which men call truth) and not operation. For as in the courts and services of princes and states it is a much easier matter to give satisfaction than to do the business; so in the inquiring of causes and reasons it is much easier to find out such causes as will satisfy the mind of man and quiet objections, than such causes as will direct him and give him light to new experiences and inventions. And this did Celsus note wisely and truly, how that the causes which are in use and whereof the knowledges now received do consist, were in time minors and subsequents to the knowledge of the particulars out of which they were induced and collected; and that it was not the light of those causes which discovered particulars, but only the particulars being first found, men did fall on glossing and discoursing of the causes; which is the reason why the learning that now is hath the curse of barrenness, and is courtesan-like, for pleasure, and not for fruit.[1] Nay to compare it rightly, the strange fiction of the poets of the transformation of Scylla seemeth to be a lively emblem of this philosophy and knowledge; a fair woman upwards in the parts of show, but when you come to the parts of use and generation, Barking

[1] Here in the transcript the chapter ended. The next sentence is written in the margin in Bacon's own hand.

Monsters; for no better are the endless distorted questions, which ever have been, and of necessity must be, the end and womb of such knowledge.

But yet nevertheless[1] here I may be mistaken, by reason of some which have much in their pen the referring sciences to action and the use of man, which mean quite another matter than I do. For they mean a contriving of directions and precepts for readiness of practice, which I discommend not, so it be not occasion that some quantity of the science be lost; for else it will be such a piece of husbandry as to put away a manor lying somewhat scattered, to buy in a close that lieth handsomely about a dwelling. But my intention contrariwise is to increase and multiply the revenues and possessions of man, and not to trim up only or order with conveniency the grounds whereof he is already stated. Wherefore the better to make myself understood that I mean nothing less than words, and directly to demonstrate the point which we are now upon, that is, what is the true end, scope, or office of knowledge, which I have set down to consist not in any plausible, delectable, reverend, or admired discourse, or any satisfactory arguments, but in effecting and working, and in discovery of particulars not revealed before for the better endowment and help of man's life; I have thought good to make as it were a Kalendar or Inventory of the wealth, furniture, or means of man according to his present estate, as far as it is known; which I do not to shew any universality of sense or knowledge, and much less to make a satire of reprehension in respect of wants and errors, but partly because cogitations new had need of some grossness and inculcation to make them perceived; and chiefly to the end that for the time to come (upon the account and state now made and cast up) it may appear what increase this new manner of use and administration of the stock (if it be once planted) shall bring with it hereafter; and for the time present (in case I should be prevented by death to propound and reveal this new light[2] as I purpose) yet I may at the least give some awaking note both of the wants in man's present condition and the nature of the supplies to be wished; though for mine own part neither

[1] This paragraph, which stands as the third fragment in the order of the transcript, is headed in the transcriber's hand, "*A part of the 9th chapter immediately precedent to the Inventory and inducing the same.*"

[2] *direction* had been written first.

do I much build upon my present *anticipations*, neither do I think ourselves yet learned or wise enough to wish reasonably: for as it asks some knowledge to demand a question not impertinent, so it asketh some sense to make a wish not absurd.[1]

The Inventory, or an enumeration and view of inventions already discovered and in use, together with a note of the wants and the nature of the supplies, being the 10*th chapter; and this* a small fragment thereof, being the preface to the Inventory.[2]

The plainest method and most directly pertinent to this intention, will be to make distribution of sciences, arts, inventions, works, and their portions, according to the use and tribute which they yield and render to the conditions of man's life, and under those several uses, being as several offices of provisions, to charge and tax what may be reasonably exacted or demanded; not guiding ourselves neither by the poverty of experiences and probations, nor according to the vanity of credulous imaginations; and then upon those charges and taxations to distinguish and present, as it were in several columns, what is extant and already found, and what is defective and further to be provided. Of which provisions, because in many of them after the manner of slothful and faulty officers and accomptants it will be returned (by way of excuse) that no such are to be had, it will be fit to give some light of the nature of the supplies, whereby it will evidently appear that they are to be compassed and procured.[3] And yet nevertheless on the other side again it will be as fit to check and control the vain and void assignations and gifts whereby certain ignorant, extravagant, and abusing wits have pretended to indue the state of man with wonders, differing as much from truth in nature as Cæsar's Commentaries differeth from the acts of King Arthur or Huon of Bourdeaux in story. For it is true that Cæsar did greater things than those idle wits had the audacity to feign their supposed worthies to have done; but he did them not in that monstrous and fabulous manner.

[1] The chapter ends before the bottom of the page; leaving about a fifth of it blank.

[2] The words *fragment only of the same*, with which the original heading ended, have a line drawn through them, and the words in Roman character are added in Bacon's hand.

[3] The concluding sentence, which is crowded into the page and overflows into the margin, has evidently been inserted subsequently to the original transcript. After "procured" there seems to be an " &c."

The chapter immediately following the Inventory; being the 11*th in order;* a part thereof.[1]

It appeareth then what is now in proposition not by general circumlocution but by particular note. No former philosophy varied in terms or method; no new *placet* or speculation upon particulars already known; no referring to action by any manual of practice; but the revealing and discovering of new inventions and operations. This to be done without the errors and conjectures of art, or the length or difficulties of experience; the nature and kinds of which inventions have been described as they could be discovered; for your eye cannot pass one kenning without further sailing; only we have stood upon the best advantages of the notions received, as upon a mount, to shew the knowledges adjacent and confining. If therefore the true end of knowledge not propounded hath bred large error, the best and perfectest condition of the same end not perceived will cause some declination. For when the butt is set up men need not rove, but except the white be placed men cannot level. This perfection we mean not in the worth of the effect, but in the nature of the direction; for our purpose is not to stir up men's hopes, but to guide their travels. The fulness of direction to work and produce any effect consisteth in two conditions, certainty and liberty. Certainty is when the direction is not only true for the most part, but infallible. Liberty is when the direction is not restrained to some definite means, but comprehendeth all the means and ways possible; for the poet saith well *Sapientibus undique latæ sunt viæ*, and where there is the greatest plurality of change, there is the greatest singularity of choice. Besides as a conjectural direction maketh a casual effect, so a particular and restrained direction is no less casual than an uncertain. For those particular means whereunto it is tied may be out of your power or may be accompanied with an overvalue of prejudice; and so if for want of certainty in direction you are frustrated in success, for want of variety in direction you are stopped in attempt. If therefore your direction be certain, it must refer you and point you to somewhat which, if it be present, the effect you seek will of necessity follow, else may you perform and not obtain. If it be free, then must it refer you to somewhat which if it be absent the effect you seek

[1] The words in Roman letters are inserted in Bacon's hand.

will of necessity withdraw, else may you have power and not attempt. This notion Aristotle had in light, though not in use. For the two commended rules by him set down, whereby the *axioms* of sciences are precepted to be made convertible, and which the latter men have not without elegancy surnamed the one the rule of truth because it preventeth deceit, the other the rule of prudence because it freeth election, are the same thing in speculation and affirmation which we now observe. An example will make my meaning attained, and yet percase make it thought that they attained it not. Let the effect to be produced be *Whiteness;* let the first direction be that if air and water be intermingled or broken in small portions together, whiteness will ensue, as in snow, in the breaking of the waves of the sea and rivers, and the like. This direction is certain, but very particular and restrained, being tied but to air and water. Let the second direction be, that if air be mingled as before with any transparent body, such nevertheless as is uncoloured and more grossly transparent than air itself, that then &c. as glass or crystal, being beaten to fine powder, by the interposition of the air becometh white; the white of an egg being clear of itself, receiving air by agitation becometh white, receiving air by concoction becometh white; here you are freed from water, and advanced to a clear body, and still tied to air. Let the third direction exclude or remove the restraint of an uncoloured body, as in amber, sapphires, &c. which beaten to fine powder become white; in wine and beer, which brought to froth become white. Let the fourth direction exclude the restraint of a body more grossly transparent than air, as in flame, being a body compounded between air and a finer substance than air; which flame if it were not for the smoke, which is the third substance that incorporateth itself and dyeth the flame, would be more perfect white. In all these four directions air still beareth a part. Let the fifth direction then be, that if any bodies, both transparent but in an unequal degree, be mingled as before, whiteness will follow; as oil and water beaten to an ointment, though by settling the air which gathereth in the agitation be evaporate, yet remaineth white; and the powder of glass or crystal put into water, whereby the air giveth place, yet remaineth white, though not so perfect. Now are you freed from air, but still you are tied to transparent bodies. To ascend further by scale I do forbear, partly because

it would draw on the example to an over-great length, but chiefly because it would open that which in this work I determine to reserve; for to pass through the whole history and observation of colours and objects visible were too long a digression; and our purpose is now to give an example of a free direction, thereby to distinguish and describe it; and not to set down a form of interpretation how to recover and attain it. But as we intend not now to reveal, so we are circumspect not to mislead; and therefore (this warning being given) returning to our purpose in hand, we admit the sixth direction to be, that all bodies or parts of bodies which are unequal equally, that is in a simple proportion, do represent whiteness [1]; we will explain this, though we induce it not. It is then to be understood, that absolute equality produceth transparence, inequality in simple order or proportion produceth whiteness, inequality in compound or respective order or proportion produceth all other colours, and absolute or orderless inequality produceth blackness; which diversity, if so gross a demonstration be needful, may be signified by four tables; a blank, a chequer, a fret, and a medley; whereof the fret is evident to admit great variety. Out of this assertion are satisfied a multitude of effects and observations, as that whiteness and blackness are most incompatible with transparence; that whiteness keepeth light, and blackness stoppeth light, but neither passeth it; that whiteness or blackness are never produced in rainbows, diamonds, crystals, and the like; that white giveth no dye, and black hardly taketh dye; that whiteness seemeth to have an affinity with dryness, and blackness with moisture; that adustion causeth blackness, and calcination whiteness; that flowers are generally of fresh colours, and rarely black, &c. All which I do now mention confusedly by way of derivation and not by way of induction. This sixth direction, which I have thus explained, is of good and competent liberty for whiteness fixed and inherent, but not for whiteness fantastical or appearing, as shall be afterwards touched. But first do you need a reduction back to certainty or verity; for it is not all position or contexture of unequal bodies that will produce colour; for *aqua fortis*, oil of *vitriol*,

[1] Compare *De Aug.* iii. 4. Vol. I. p. 566. "At in Metaphysicâ, si fiat inquisitio, hujusmodi quidpiam reperies; Corpora duo Diaphana intermixta, Portionibus eorum Opticis simplici ordine sive æqualiter collocatis, constituere Albedinem." And observe that this sentence is not to be found in the corresponding passage of the *Advancement of Learning*, but is interpolated in the translation.

&c. more manifestly, and many other substances more obscurely, do consist of very unequal parts, which yet are transparent and clear. Therefore the reduction must be, that the bodies or parts of bodies so intermingled as before be of a certain grossness or magnitude; for the unequalities which move the sight must have a further dimension and quantity than those which operate many other effects. Some few grains of saffron will give a tincture to a tun of water; but so many grains of civet will give a perfume to a whole chamber of air. And therefore when Democritus (from whom Epicurus did borrow it) held that the position of the solid portions was the cause of colours, yet in the very truth of his assertion he should have added, that the portions are required to be of some magnitude. And this is one cause why colours have little inwardness and necessitude with the nature and proprieties of things, those things resembling in colour which otherwise differ most, as salt and sugar, and contrariwise differing in colour which otherwise resemble most, as the white and blue violets, and the several veins of one agate or marble, by reason that other virtues consist in more subtile proportions than colours do; and yet are there virtues and natures which require a grosser magnitude than colours, as well as scents and divers other require a more subtile; for as the portion of a body will give forth scent which is too small to be seen, so the portion of a body will shew colours which is too small to be endued with weight; and therefore one of the prophets with great elegancy describing how all creatures carry no proportion towards God the creator, saith, *That all the nations in respect of him are like the dust upon the balance*, which is a thing appeareth but weigheth not. But to return, there resteth a further freeing of this sixth direction; for the clearness of a river or stream sheweth white at a distance, and crystalline glasses deliver the face or any other object falsified in whiteness, and long beholding the snow to a weak eye giveth an impression of azure rather than of whiteness. So as for whiteness in apparition only and representation by the qualifying of the light, altering the *intermedium*, or affecting the eye itself, it reacheth not. But you must free your direction to the producing of such an incidence, impression, or operation, as may cause a precise and determinate passion of the eye; a matter which is much more easy to induce

than that which we have passed through; but yet because it hath a full coherence both with that act of radiation (which hath hitherto been conceived and termed so unproperly and untruly by some an effluxion of spiritual species and by others an investing of the *intermedium* with a motion which successively is conveyed to the eye) and with the act of sense, wherein I should likewise open that which I think good to withdraw, I will omit. Neither do I contend but that this motion which I call the freeing of a direction, in the received philosophies (as far as a swimming anticipation could take hold) might be perceived and discerned; being not much other matter than that which they did not only aim at in the two rules of *Axioms* before remembered, but more nearly also in[1] that which they term the form or formal cause, or that which they call the true difference; both which nevertheless it seemeth they propound rather as impossibilities and wishes than as things within the compass of human comprehension. For Plato casteth his burden and saith *that he will revere him as a God, that can truly divide and define*[2]; which cannot be but by true forms and differences. Wherein I join hands with him, confessing as much as yet assuming to myself little; for if any man can by the strength of his *anticipations* find out forms, I will magnify him with the foremost. But as any of them would say that if divers things which many men know by instruction and observation another knew by revelation and without those means, they would take him for somewhat supernatural and divine; so I do acknowledge that if any man can by anticipations reach to that which a weak and inferior wit may attain to by interpretation, he cannot receive too high a title. Nay I for my part do indeed admire to see how far some of them have proceeded by their *anticipations;* but how? it is as I wonder at some blind men, to see what shift they make without their eye-sight; thinking with myself that if I were blind I could hardly do it. Again Aristotle's school confesseth that there is no true knowledge but by causes, no true cause but the form, no true form known except one, which they are pleased to allow; and therefore thus far their evidence standeth with us, that both hitherto there hath been nothing but a shadow of knowledge, and that we propound now that which is agreed to be worthiest to be sought, and hardest to be found. There wanteth now a part

[1] *than* in MS.

[2] See *Nov. Org.* ii. 26. Vol. I. p. 277.

very necessary, not by way of supply but by way of caution; for as it is seen for the most part that the outward tokens and badges of excellency and perfection are more incident to things merely counterfeit than to that which is true, but for[1] a meaner and baser sort; as a dubline is more like a perfect ruby than a spinel, and a counterfeit angel is made more like a true angel than if it were an angel coined of China gold; in like manner the direction carrieth a resemblance of a true direction in verity and liberty which indeed is no direction at all. For though your direction seem to be certain and free by pointing you to a nature that is unseparable from the nature you inquire upon, yet if it do not carry you on a degree or remove nearer to action, operation, or light to make or produce, it is but superficial and counterfeit. Wherefore to secure and warrant what is a true direction, though that general note I have given be perspicuous in itself (for a man shall soon cast with himself whether he be ever the nearer[2] to effect and operate or no, or whether he have won but an abstract or varied notion) yet for better instruction I will deliver three particular notes of caution. The first is that the nature discovered be more original than the nature supposed, and not more secondary or of the like degree; as to make a stone bright or to make it smooth it is a good direction to say, make it even; but to make a stone even it is no good direction to say, make it bright or make it smooth; for the rule is that the disposition of any thing referring to the state of it in itself or the parts, is more original than that which is relative or transitive towards another thing. So evenness is the disposition of the stone in itself, but smooth is to the hand and bright to the eye, and yet nevertheless they all cluster and concur; and yet the direction is more unperfect, if it do appoint you to such a relative as is in the same kind and not in a diverse. For in the direction to produce brightness by smoothness, although properly it win no degree, and will never teach you any new particulars before unknown; yet by way of suggestion or bringing to mind it may draw your consideration to some particulars known but not remembered; as you shall sooner remember some practical means of making smoothness, than if you had fixed your consideration only upon brightness; but if the direction had been to make brightness

[1] So MS. qu *of?* [2] *neare* MS.

by making reflexion, as thus, make it such as you may see your face in it, this is merely secondary, and helpeth neither by way of informing nor by way of suggestion. So if in the inquiry of whiteness you were directed to make such a colour as should be seen furthest in a dark light; here you are advanced nothing at all. For these kinds of natures are but proprieties, effects, circumstances, concurrences, or what else you shall like to call them, and not radical and formative natures towards the nature supposed. The second caution is that the nature inquired be collected by division before composition, or to speak more properly, by composition subaltern before you ascend to composition absolute, &c.[1]

Of the internal and profound errors and superstitions in the nature of the mind, and of the four sorts of idols or fictions which offer themselves to the understanding in the inquisition of knowledge; being the 16th chapter, and this a small fragment thereof, being a preface to the inward elenches of the mind.[2]

The opinion of Epicurus that the gods were of human shape, was rather justly derided than seriously confuted by the other sects, demanding whether every kind of sensible creatures did not think their own figure fairest, as the horse, the bull, and the like, which found no beauty but in their own forms, as in appetite of lust appeared. And the heresy of the Anthropomorphites was ever censured for a gross conceit bred in the obscure cells of solitary monks that never looked abroad. Again the fable so well known of *Quis pinxit leonem*, doth set forth well that there is an error of pride and partiality, as well as of custom and familiarity. The reflexion also from glasses so usually resembled to the imagery of the mind, every man knoweth to receive error and variety both in colour, magnitude, and shape, according to the quality of the glass. But yet no use hath been made of these and many the like observations, to move men to search out and upon search to give true cautions of the native and inherent errors in the mind of man which have coloured and corrupted all his notions and impressions.

I do find therefore in this enchanted glass four Idols or false

[1] The word "subaltern" (for which a blank was left by the transcriber) and the "&c." have been inserted by Bacon. The chapter ends nearly at the bottom of the page.

[2] The words in Roman character have been added by Bacon.

appearances of several and distinct sorts, every sort comprehending many subdivisions: the first sort, I call idols of the *Nation* or *Tribe;* the second, idols of the *Palace*; the third, idols of the *Cave;* and the fourth, idols of the *Theatre,* &c.[1]

Here followeth an abridgment of divers chapters of the first book of Interpretation of Nature.[2]

Cap. 12.

That in deciding and determining of the truth of knowledge, men have put themselves upon trials not competent. That antiquity and authority; common and confessed notions; the natural and yielding consent of the mind; the harmony and coherence of a knowledge in itself; the establishing of principles with the touch and reduction of other propositions unto them; inductions without instances contradictory; and the report of the senses; are none of them absolute and infallible evidence of truth, and bring no security sufficient for effects and operations. That the discovery of new works and active directions not known before, is the only trial to be accepted of; and yet not that neither, in case where one particular giveth light to another; but where particulars induce an axiom or observation, which axiom found out discovereth and designeth new particulars. That the nature of this trial is not only upon the point, whether the knowledge be profitable or no, but even upon the point whether the knowledge be true or no; not because you may always conclude that the Axiom which discovereth new instances is true, but contrariwise you may safely conclude that if it discover not any new instance it is in vain and untrue. That by new instances are not always to be understood new recipes but new assignations, and of the diversity between these two. That the subtilty of words, arguments, notions, yea of the senses themselves, is but rude and gross in comparison of the subtilty of things; and of the slothful and flattering opinions of those which pretend to honour the mind of man in withdrawing and abstracting it from particulars, and of the inducements and motives whereupon such opinions have been conceived and received.

[1] The "&c." in Bacon's hand. The chapter ends in the middle of the second page, and the heading of the next (which is the 4th), follows immediately; whence I infer that the whole formed part of the original transcript.

[2] The words "Interpretation of Nature" added in Bacon's hand.

Cap. 13.

Of the error in propounding chiefly the search of causes and productions of things concrete, which are infinite and transitory, and not of abstract natures, which are few and permanent. That these natures are as the alphabet or simple letters, whereof the variety of things consisteth; or as the colours mingled in the painter's shell, wherewith he is able to make infinite variety of faces or shapes.[1] An enumeration of them according to popular note. That at the first one would conceive that in the schools by natural philosophy were meant the knowledge of the efficients of things concrete; and by metaphysic the knowledge of the forms of natures simple; which is a good and fit division of knowledge: but upon examination there is no such matter by them intended. That the little inquiry into the production of simple natures sheweth well that works were not sought; because by the former knowledge some small and superficial deflexions from the ordinary generations and productions may be found out, but the discovery of all profound and radical alteration must arise out of the latter knowledge.

Cap. 14.

Of the error in propounding the search of the materials or dead beginnings or principles of things, and not the nature of motions, inclinations, and applications. That the whole scope of the former search is impertinent and vain; both because there are no such beginnings, and if there were they could not be known. That the latter manner of search (which is all) they pass over compendiously and slightly as a by-matter. That the several conceits in that kind, as that the lively and moving beginnings of things should be shift or appetite of matter to privation; the spirit of the world working in matter according to platform; the proceeding or fructifying of distinct kinds according to their proprieties; the intercourse of the elements by mediation of their common qualities; the appetite of like portions to unite themselves; amity and discord, or sympathy and antipathy; motion to the centre, with motion of stripe or press; the casual agitation, aggregation, and essays of the solid portions in the void space; motion of shuttings and openings; are all mere nugations; and that the calculating and ordination of the true degrees,

[1] This last illustration is added in the margin in Bacon's hand.

moments, limits, and laws of motions and alterations (by means whereof all works and effects are produced), is a matter of a far other nature than to consist in such easy and wild generalities.

Cap. 15.

Of the great error of inquiring knowledge in Anticipations. That I call Anticipations the voluntary collections that the mind maketh of knowledge; which is every man's reason. That though this be a solemn thing, and serves the turn to negotiate between man and man (because of the conformity and participation of men's minds in the like errors), yet towards inquiry of the truth of things and works it is of no value. That civil respects are a lett that this pretended reason should not be so contemptibly spoken of as were fit and medicinable, in regard that[1] hath been too much exalted and glorified, to the infinite detriment of man's estate. Of the nature of words and their facility and aptness to cover and grace the defects of Anticipations. That it is no marvel if these Anticipations have brought forth such diversity and repugnance in opinions, theories, or philosophies, as so many fables[2] of several arguments. That had not the nature of civil customs and government been in most times somewhat adverse to such innovations, though contemplative, there might have been and would have been many more. That the second school of the Academics and the sect of Pyrrho, or the considerers that denied comprehension, as to the disabling of man's knowledge (entertained in Anticipations) is well to be allowed, but that they ought when they had overthrown and purged the floor of the ruins to have sought to build better in place. And more especially that they did unjustly and prejudicially to charge the deceit upon the report of the senses, which admitteth very sparing remedy; being indeed to have been charged upon the Anticipations of the mind, which admitteth a perfect remedy. That the information of the senses is sufficient, not because they err not, but because the use of the sense in discovering of knowledge is for the most part not immediate. So that it is the work, effect, or instance, that trieth the Axiom, and the sense doth but try the work done or not done, being or not being. That the mind of man in collecting

[1] So MS. by mistake probably for *it*; the transcriber taking *yt* for *y*^{t}.
[2] *fable* in MS.

knowledge needeth great variety of helps, as well as the hand of man in manual and mechanical practices needeth great variety of instruments. And that it were a poor work that if instruments were removed men would overcome with their naked hands. And of the distinct points of want and insufficiency in the mind of man.

Cap. 16.

That the mind of a man, as it is not a vessel of that content or receipt to comprehend knowledge without helps and supplies, so again it is not sincere, but of an ill and corrupt tincture. Of the inherent and profound errors and superstitions in the nature of the mind, and of the four sorts of Idols or false appearances that offer themselves to the understanding in the inquisition of knowledge; that is to say, the Idols of the Tribe, the Idols of the Palace, the Idols of the Cave, and the Idols of the Theatre. That these four, added to the incapacity of the mind and the vanity and malignity of the affections, leave nothing but impotency and confusion. A recital of the particular kinds of these four Idols, with some chosen examples of the opinions they have begot, such of them as have supplanted the state of knowledge most.

Cap. 17.

Of the errors of such as have descended and applied themselves to experience, and attempted to induce knowledge upon particulars. That they have not had the resolution and strength of mind to free themselves wholly from Anticipations, but have made a confusion and intermixture of Anticipations and observations, and so vanished. That if any have had the strength of mind generally to purge away and discharge all Anticipations, they have not had that greater and double strength and patience of mind, as well to repel new Anticipations after the view and search of particulars, as to reject old which were in their mind before; but have from particulars and history flown up to principles without the mean degrees, and so framed all the middle generalities or axioms, not by way of scale or ascension from particulars, but by way of de-

rivation from principles; whence hath issued the infinite chaos of shadows and notions[1], wherewith both books and minds have[2] been hitherto, and may be yet hereafter much more pestered. That in the course of those derivations, to make them yet the more unprofitable, they have used when any light of new instance opposite to any assertion appeared, rather to reconcile the instance than to amend the rule. That if any have had or shall have the power and resolution to fortify and inclose his mind against all Anticipations, yet if he have not been or shall not be cautioned by the full understanding of the nature of the mind and spirit of man, and therein of the seats pores and passages both of knowledge and error, he hath not been nor shall not be possibly able to guide or keep on his course aright. That those that have been conversant in experience and observation have used, when they have intended to discover the cause of any effect, to fix their consideration narrowly and exactly upon that effect itself with all the circumstances thereof, and to vary the trial thereof as many ways as can be devised; which course amounteth but to a tedious curiosity, and ever breaketh off in wondering and not in knowing; and that they have not used to enlarge their observation to match and sort that effect with instances of a diverse subject, which[3] must of necessity be before any cause be found out. That they have passed over the observation of instances vulgar and ignoble, and stayed their attention chiefly upon instances of mark; whereas the other sort are for the most part more significant and of better light and information. That every particular that worketh any effect is a thing compounded (more or less) of diverse single natures, (more manifest and more obscure,) and that it appeareth not to whether of the natures the effect is to be ascribed, and yet notwithstanding they have taken a course without breaking particulars and reducing them by exclusions and inclusions to a definite point, to conclude upon inductions in gross, which empirical course is no less vain than the scholastical. That all such as have sought action and work out of their inquiry have been hasty and pressing to

[1] This word is written between the lines in Bacon's hand, and I am not sure that I read it right. Stephens read it *moths*, which is certainly wrong. It is more like *notions* than any word I can think of.

[2] *hath* in MS.

[3] The words "according to their own rules" follow in the MS., but a line is drawn through them.

discover some practices for present use, and not to discover Axioms, joining with them the new assignations as their sureties. That the forerunning of the mind to frame recipes upon Axioms at the entrance, is like Atalanta's golden ball that hindereth and interrupteth the course, and is to be inhibited till you have ascended to a certain stage and degree of generalities; which forbearance will be liberally recompensed in the end; and that chance discovereth new inventions by one and one, but science by knots and clusters. That they have not collected sufficient quantity of particulars, nor them in sufficient certainty and subtilty, nor of all several kinds, nor with those advantages and discretions in the entry and sorting which are requisite; and of the weak manner of collecting natural history which hath been used. Lastly that they had no knowledge of the formulary of interpretation, the work whereof is to abridge experience and to make things as certainly found out by Axiom in short time, as by infinite experiences in ages.

Cap. 18.

That the cautels and devices put in practice in the delivery of knowledge for the covering and palliating of ignorance, and the gracing and overvaluing of that they utter, are without number; but none more bold and more hurtful than two; the one that men have used of a few observations upon any subject to make a solemn and formal art, by filling it up with discourse, accommodating it with some circumstances and directions to practice, and digesting it into method, whereby men grow satisfied and secure, as if no more inquiry were to be made of that matter; the other, that men have used to discharge ignorance with credit, in defining all those effects which they cannot attain unto to be out of the compass of art and human endeavour. That the very styles and forms of utterance are so many characters of imposture, some choosing a style of pugnacity and contention, some of satire and reprehension, some of plausible and tempting similitudes and examples, some of great words and high discourse, some of short and dark sentences, some of exactness of method, all of positive affirmation, without disclosing the true motives and proofs of their opinions, or free confessing their ignorance or doubts,

except it be now and then for a grace, and in cunning to win the more credit in the rest, and not in good faith. That although men be free from these errors and incumbrances in the will and affection, yet it is not a thing so easy as is conceived to convey the conceit of one man's mind into the mind of another without loss or mistaking, specially in notions new and differing from those that are received. That never any knowledge was delivered in the same order it was invented, no not in the mathematic, though it should seem otherwise in regard that the propositions placed last do use the propositions or grants placed first for their proof and demonstration. That there are forms and methods of tradition wholly distinct and differing, according to their ends whereto they are directed. That there are two ends of tradition of knowledge, the one to teach and instruct for use and practice, the other to impart or intimate for re-examination and progression. That the former of these ends requireth a method not the same whereby it was invented and induced, but such as is most compendious and ready whereby it may be used and applied. That the latter of the ends, which is where a knowledge is delivered to be continued and spun on by a succession of labours, requireth a method whereby it may be transposed to another in the same manner as it was collected, to the end it may be discerned both where the work is weak, and where it breaketh off. That this latter method is not only unfit for the former end, but also impossible for all knowledge gathered and insinuated by Anticipations, because the mind working inwardly of itself, no man can give a just account how he came to that knowledge which he hath received, and that therefore this method is peculiar for knowledge gathered by interpretation. That the discretion anciently observed, though by the precedent of many vain persons and deceivers disgraced, of publishing part, and reserving part to a private succession, and of publishing in a manner whereby it shall not be to the capacity nor taste of all, but shall as it were single and adopt his reader, is not to be laid aside, both for the avoiding of abuse in the excluded, and the strengthening of affection in the admitted. That there are other virtues of tradition, as that there be no occasion given to error, and that it carry a vigour to root and spread against the vanity of wits and injuries of time; all which if they were ever due to any knowledge delivered, or if they were never

due to any human knowledge heretofore delivered, yet are now due to the knowledge propounded.

Cap. 19.

Of the impediments which have been in the affections, the principle whereof hath been despair or diffidence, and the strong apprehension of the difficulty, obscurity, and infiniteness which belongeth to the invention of knowledge, and that men have not known their own strength, and that the supposed difficulties and vastness of the work is rather in shew and muster than in state or substance where the true way is taken. That this diffidence hath moved and caused some never to enter into search, and others when they have been entered either to give over or to seek a more compendious course than can stand with the nature of true search. That of those that have refused and prejudged inquiry, the more sober and grave sort of wits have depended upon authors and traditions, and the more vain and credulous resorted to revelation and intelligence with spirits and higher natures. That of those that have entered into search, some having fallen upon some conceits which they after consider to be the same which they have found in former authors, have suddenly taken a persuasion that a man shall but with much labour incur and light upon the same inventions which he might with ease receive from others; and that it is but a vanity and self-pleasing of the wit to go about again, as one that would rather have a flower of his own gathering, than much better gathered to his hand. That the same humour of sloth and diffidence suggesteth that a man shall but revive some ancient opinion, which was long ago propounded, examined, and rejected. And that it is easy to err in conceit that a man's observation or notion is the same with a former opinion, both because new conceits must of necessity be uttered in old words, and because [1] upon true and erroneous grounds men may meet in consequence or conclusion, as several lines or circles that cut in some one point. That the greatest part of those that have descended into search have chosen for the most artificial and compendious course to induce principles out of particulars, and to reduce all other

[1] A parenthesis "(as the Schools well know)" which follows here, has a line drawn through it.

propositions unto principles; and so instead of the nearest way, have been led to no way or a mere labyrinth. That the two contemplative ways have some resemblance with the old parable of the two moral ways, the one beginning with incertainty and difficulty, and ending in plainness and certainty, and the other beginning with shew of plainness and certainty, and ending in difficulty and incertainty. Of the great and manifest error and untrue conceit or estimation of the infiniteness of particulars, whereas indeed all prolixity is in discourse and derivations; and of the infinite and most laborious expence of wit that hath been employed upon toys and matters of no fruit or value. That although the period of one age cannot advance men to the furthest point of interpretation of nature, (except the work should be undertaken with greater helps than can be expected), yet it cannot fail in much less space of time to make return of many singular commodities towards the state and occasions of man's life. That there is less reason of distrust in the course of interpretation now propounded than in any knowledge formerly delivered, because this course doth in sort equal men's wits, and leaveth no great advantage or preeminence to the perfect and excellent motions of the spirit. That to draw a straight line or to make a circle perfect round by aim of hand only, there must be a great difference between an unsteady and unpractised hand and a steady and practised, but to do it by rule or compass it is much alike.

Cap. 21.

Of the impediments which have been in the two extreme humours of admiration of antiquity and love of novelty, and again of over-servile reverence or over-light scorn of the opinions of others.

Cap. 22.

Of the impediments which have been in the affection of pride, specially of one kind, which is the disdain of dwelling and being conversant much in experiences and particulars, specially such as are vulgar in occurrency, and base and ignoble in use. That besides certain higher mysteries of pride, generalities seem to have a dignity and solemnity, in that they do not put men in mind of their familiar actions, in that they

have less affinity with arts mechanical and illiberal, in that they are not so subject to be controuled by persons of mean observation, in that they seem to teach men that they know not, and not to refer them to that they know. All which conditions directly feeding the humour of pride, particulars do want. That the majesty of generalities, and the divine nature of the mind in taking them (if they be truly collected, and be indeed the direct reflexions of things,) cannot be too much magnified. And that it is true that interpretation is the very natural and direct intention, action, and progression of the understanding delivered from impediments. And that all Anticipation is but a deflexion or declination by accident.

Cap. 25.

Of the impediments which have been in the state of heathen religion and other superstitions and errors of religion. And that in the true religion there hath not[1] nor is any impediment, except it be by accident or intermixture of humour. That a religion which consisteth in rites and forms of adoration, and not in confessions and beliefs, is adverse to knowledge; because men having liberty to inquire and discourse of Theology at pleasure, it cometh to pass that all inquisition of nature endeth and limiteth itself in such metaphysical or theological discourse; whereas if men's wits be shut out of that port, it turneth them again to discover, and so to seek reason of reason more deeply. And that such was the religion of the Heathen. That a religion that is jealous of the variety of learning, discourse, opinions, and sects, (as misdoubting it may shake the foundations,) or that cherisheth devotion upon simplicity and ignorance, as ascribing ordinary effects to the immediate working of God, is adverse to knowledge. That such is the religion of the Turk, and such hath been the abuse of Christian religion at some several times, and in some several factions. And of the singular advantage which the Christian religion hath towards the furtherance of true knowledge, in that it excludeth and interdicteth human reason, whether by interpretation or anticipation, from examining or discussing of the mysteries and principles of faith.

[1] So MS.

Cap. 26.

Of the impediments which have been in the nature of society and the policies of state. That there is no composition of estate or society, nor order or quality of persons, which have not some point of contrariety towards true knowledge. That monarchies incline wits to profit and pleasure, and commonwealths to glory and vanity. That universities incline wits to sophistry and affectation, cloisters to fables and unprofitable subtilty, study at large to variety; and that it is hard to say, whether mixture of contemplations with an active life, or retiring wholly to contemplations, do disable and hinder the mind more.

ADVANCEMENT OF LEARNING

PREFACE

TO

THE ADVANCEMENT OF LEARNING.

THE first edition of the *Advancement of Learning* is dated 1605. In what month it appeared is doubtful; but from certain allusions in a letter sent by Bacon to Tobie Matthew with a presentation copy, I gather (for the letter bears no date) that it was not out before the latter end of October.

Tobie Matthew, eldest son of the Bishop of Durham, was then about 27 years old, and had been intimate with Bacon, certainly for the last three years, and probably for more. Bacon had a high opinion of his abilities and seems to have consulted him about his works. "I have now at last (he says in this letter) taught that child to go, at the swaddling whereof you were. My work touching the *Proficiency and Advancement of Learning* I have put into two books, whereof the former, which you saw, I account but as a Page to the latter. I have now published them both, whereof I thought it a small adventure to send you a copy, who have more right to it than any man, except Bishop Andrews, who was my Inquisitor."[1]

Now Matthew had been abroad since April, 1605; and as he had seen the first book only, it is probable that the second was not then written; a circumstance which may be very naturally accounted for, if I am right in supposing that the *Advancement of Learning* was begun immediately after the accession of James I. From the death of Elizabeth, 24th March, 1602-3, to the meeting of James's first Parliament, 19th March, 1603-4, Bacon had very little to do. He held indeed the same place among the Learned Counsel which he had held under Elizabeth, but his services were little if at all used. On the 3d of July, 1603, we find him writing to Lord Cecil:—"For my

[1] Sir Tobie Matthew's collection of English letters, p. xi. Andrews was made a Bishop on the 3d of November, 1605.

purpose or course, I desire to meddle as little as I can in the King's causes, his Majesty now abounding in counsel. . . . My ambition now I shall only put upon my pen, whereby I shall be able to maintain memory and merit of the times succeeding." And in the trial of Sir Walter Raleigh at Winchester in the following November (though it was a complicated case involving many persons and requiring a great number of examinations) he does not appear to have been employed at all. But from the meeting of Parliament in March till the end of 1604 he was incessantly employed; first during the session (which lasted till the 7th of July) in the business of the House of Commons; then during the vacation, in preparation for the Commission of the Union[1] which was to meet in October; and from that time to the beginning of December in the business of the Commission itself; — all matters of extreme urgency and importance, and the "labour whereof, for men of his profession, rested most upon his hand."[2]

On the 4th of December the Commissioners signed their report; and on the 24th the next meeting of Parliament, which had been fixed for February, was postponed till October. This prorogation secured Bacon another interval of leisure; an interval longer perhaps, considering the nature of the public services which had now fallen upon him, than he was likely soon again to enjoy; and which it was the more important therefore to use in finishing the great literary work which he had begun. The same consideration may have determined him to be content with a less perfect treatment of the subject than he had originally designed; for certainly the second book, though so much the more important of the two, is in point of execution much less careful and elaborate than the first, and bears many marks of hasty composition. The presumption that an interval occurred between the writing of the two is further confirmed by the fact that they were not printed at the same time. The first ends with a half-sheet, and the second begins upon a fresh one with a new signature; whence I suppose we may infer that the first had been printed off before the second was ready for the press.

Of the motives which induced Bacon to undertake and

[1] See "Certain Articles or Considerations touching the union of the Kingdoms of England and Scotland; collected and dispersed for His Majesty's better service."

[2] Letter to the King, touching the Solicitor's place.

hurry forward the *Advancement of Learning* at that particular time, and of those which afterwards suggested the incorporation of it into his great work on the Interpretation of Nature, I have already explained my own view in my preface to the *De Augmentis*. Upon all matters requiring explanation or illustration the reader is referred to Mr. Ellis's notes upon the corresponding passages in that more finished work; and that the reference may be more easy I have marked the places where the several chapters begin; adding some account, more or less complete, of the principal differences between the two. In many cases these differences are so extensive that no adequate idea of their nature could be given within the limits of a note; and in such cases I have been content with a simple reference to the place. But where the substance of any addition or alteration which seemed to me material could be stated succinctly, — especially if it involved any modification of the opinion expressed in the text, — I have generally endeavoured to state it; sometimes translating Bacon's words, sometimes giving the effect in my own, as I found most convenient.

For the text, I have treated the edition of 1605 as the only original authority; the corrections introduced by later editors, though often unquestionably right, being (as far as I can see) merely conjectural. And therefore, though I have adopted all such corrections into the text whenever I was satisfied that they give the true reading, I have always quoted in a note the reading of the original. Only in the typographical arrangement with respect to capitals, italics, &c., (which in the original was probably left to the printer's taste, and is inconsistent in itself, and would be perplexing to modern eyes,) and also in the punctuation, which is extremely confused and inaccurate, I have used the full liberty of my own judgment; altering as much as I pleased, and endeavouring only to make the sense clear to an eye accustomed to modern books, without encumbering the page with any notice of such alterations.

There is one innovation however which I have ventured to introduce and which it is necessary to explain. The *Advancement of Learning* was written for readers who were familiar with Latin, and abounds with Latin quotations. In these days it may be read with profit by many persons of both sexes to whom such quotations are a very perplexing obstruction. Forming as they generally do a part of the context, so that the

sentence is not complete without them, those who cannot read Latin are in many cases unable to follow the sense of the English. To give such readers the means of understanding them seemed therefore no less than necessary; and I thought the true effect of them would be conveyed to the mind most perfectly and satisfactorily by presenting the interpretations in such a form that they might be read in their places, just as they would have been had they formed part of the original text, and just as they are in those passages where Bacon has himself furnished the interpretation. Following his example therefore as nearly as I could, I have endeavoured to give the effect of each of these Latin quotations in such a form as seemed to suit best the English idiom and to fall best into the English context; not tying myself to literal translation, but rather preferring to vary the expression, especially where I could by that means give it such a turn as to throw the emphasis more distinctly upon that part of the quotation which was more particularly in point. Thus it will be found, I think, that those who understand the Latin may still read the English without feeling it to be a mere repetition, while those who do not will in reading the English alone find the sense always complete. It was evident however that translations of this kind could not be read in this way conveniently if inserted in notes at the bottom of the page; and therefore, there being no room in the margin, I have ventured to insert them in the text; from which however, that they may not be mistaken for a part of it, I have always taken care to distinguish them by brackets. In a few cases where a Latin quotation occurs, not followed by a translation within brackets, it is to be understood that it is introduced merely as a voucher for what has just been said in the English, or for the purpose of suggesting a classical allusion which a translation would not suggest except to a classical reader, and that the sense is complete without it. In a few other cases where a quotation is followed by a translation *not* included within brackets, it is to be understood that it is Bacon's own translation and forms part of the original text.

For all the notes except those signed *R. L. E.*, which are Mr. Ellis's, I am responsible.

J. S.

THE

TWOO BOOKES OF FRANCIS BACON

OF THE

PROFICIENCE

AND

ADVANCEMENT OF LEARNING

DIVINE AND HUMANE.

TO THE KING.

AT LONDON:
Printed for Henrie Tomes, and are to be sold at his shop at Graies Inne Gate in Holborne.
1605.

THE

FIRST BOOK OF FRANCIS BACON

OF THE

PROFICIENCE AND ADVANCEMENT OF LEARNING

DIVINE AND HUMAN.

TO THE KING.

THERE were under the Law (excellent King) both daily sacrifices and freewill offerings; the one proceeding upon ordinary observance, the other upon a devout cheerfulness. In like manner there belongeth to kings from their servants both tribute of duty and presents of affection. In the former of these I hope I shall not live to be wanting, according to my most humble duty, and the good pleasure of your Majesty's employments: for the later, I thought it more respective to make choice of some oblation which might rather refer to the propriety and excellency of your individual person, than to the business of your crown and state.

Wherefore representing your Majesty many times unto my mind, and beholding you not with the inquisitive eye of presumption to discover that which the Scripture telleth me is inscrutable, but with the observant eye of duty and admiration; leaving aside the other parts of your virtue and fortune, I have been touched, yea and possessed with an extreme wonder at those your virtues and faculties which the philosophers call intellectual; the largeness of your capacity, the faithfulness of your memory, the swiftness of your apprehension, the penetration of your judgment, and the facility and order of your elocution: and I have often thought that of all the persons

living that I have known, your Majesty were the best instance to make a man of Plato's opinion, that all knowledge is but remembrance, and that the mind of man by nature knoweth all things, and hath but her own native and original notions [1] (which by the strangeness and darkness of this tabernacle of the body are sequestered) again revived and restored: such a light of nature I have observed in your Majesty, and such a readiness to take flame and blaze from the least occasion presented, or the least spark of another's knowledge delivered. And as the Scripture saith of the wisest king, *That his heart was as the sands of the sea;* which though it be one of the largest bodies yet it consisteth of the smallest and finest portions; so hath God given your Majesty a composition of understanding admirable, being able to compass and comprehend the greatest matters, and nevertheless to touch and apprehend the least; whereas it should seem an impossibility in nature for the same instrument to make itself fit for great and small works. And for your gift of speech, I call to mind what Cornelius Tacitus saith of Augustus Cæsar; *Augusto profluens, et quæ principem deceret, eloquentia fuit;* [that his style of speech was flowing and prince-like: [2]] for if we note it well, speech that is uttered with labour and difficulty, or speech that savoureth of the affectation of art and precepts, or speech that is framed after the imitation of some pattern of eloquence, though never so excellent, — all this has somewhat servile, and holding of the subject. But your Majesty's manner of speech is indeed prince-like, flowing as from a fountain, and yet streaming and branching itself into nature's order, full of facility and felicity, imitating none, and inimitable by any. And as in your civil estate there appeareth to be an emulation and contention of your Majesty's virtue with your fortune; a virtuous disposition with a fortunate regiment; a virtuous expectation (when time was) of your greater fortune, with a prosperous possession thereof in the due time; a virtuous observation of the laws of marriage, with most blessed and happy fruit of marriage; a virtuous and most Christian desire of peace, with a fortunate inclination in your neighbour princes thereunto: so likewise in these intellectual matters, there seemeth to be no

[1] So edd. 1629 and 1633. Ed. 1605 has *motions*.

[2] Observe that the translations within brackets are not in the original, but inserted by myself. My reasons for adopting this plan, and the principle upon which I have proceeded in translating, are explained in the preface.

less contention between the excellency of your Majesty's gifts of nature and the universality and perfection of your learning. For I am well assured that this which I shall say is no amplification at all, but a positive and measured truth; which is, that there hath not been since Christ's time any king or temporal monarch which hath been so learned in all literature and erudition, divine and human. For let a man seriously and diligently revolve and peruse the succession of the emperors of Rome, of which Cæsar the dictator, who lived some years before Christ, and Marcus Antoninus were the best learned; and so descend to the emperors of Græcia, or of the West, and then to the lines of France, Spain, England, Scotland, and the rest; and he shall find this judgment is truly made.[1] For it seemeth much in a king, if by the compendious extractions of other men's wits and labours he can take hold of any superficial ornaments and shews of learning, or if he countenance and prefer learning and learned men: but to drink indeed of the true fountains of learning, nay to have such a fountain of learning in himself, in a king, and in a king born, is almost a miracle. And the more, because there is met in your Majesty a rare conjunction as well of divine and sacred literature as of profane and human; so as your Majesty standeth invested of that triplicity which in great veneration was ascribed to the ancient Hermes; the power and fortune of a King, the knowledge and illumination of a Priest, and the learning and universality of a Philosopher. This propriety inherent and individual attribute in your Majesty deserveth to be expressed not only in the fame and admiration of the present time, nor in the history or tradition of the ages succeeding; but also in some solid work, fixed memorial, and immortal monument, bearing a character or signature both of the power of a king and the difference and perfection of such a king.

Therefore I did conclude with myself, that I could not make unto your Majesty a better oblation than of some treatise tending to that end; whereof the sum will consist of these two parts: the former concerning the excellency of learning and knowledge, and the excellency of the merit and true glory in the augmentation and propagation thereof; the later[2], what the particular acts and works are which have been embraced

[1] In the translation the reference to the particular dynasties is omitted; he only says,—*Percurrat qui voluerit imperatorum et rerum seriem, et juxta mecum sentiet.*

[2] I have observed elsewhere, that it was only the latter part which entered into the original scheme of the *Instauratio Magna.* And though in adapting the *Advancement*

and undertaken for the advancement of learning, and again what defects and undervalues I find in such particular acts; to the end that though I cannot positively or affirmatively advise your Majesty, or propound unto you framed particulars, yet I may excite your princely cogitations to visit the excellent treasure of your own mind, and thence to extract particulars for this purpose agreeable to your magnanimity and wisdom.

In the entrance to the former of these,—to clear the way, and as it were to make silence to have the true testimonies concerning the dignity of learning to be better heard without the interruption of tacit objections,—I think good to deliver it from the discredits and disgraces which it hath received; all from ignorance; but ignorance severally disguised; appearing sometimes in the zeal and jealousy of divines, sometimes in the severity and arrogancy of politiques, and sometimes in the errors and imperfections of learned men themselves.

I hear the former sort say, that knowledge is of those things which are to be accepted of with great limitation and caution; that the aspiring to over-much knowledge was the original temptation and sin, whereupon ensued the fall of man; that knowledge hath in it somewhat of the serpent, and therefore where it entereth into a man it makes him swell, — *Scientia inflat,* [knowledge puffeth up;] that Salomon gives a censure, *That there is no end of making books, and that much reading is weariness of the flesh;* and again in another place, *That in spacious knowledge there is much contristation, and that he that increaseth knowledge increaseth anxiety;* that St. Paul gives a caveat, *That we be not spoiled through vain philosophy;* that experience demonstrates how learned men have been arch-heretics, how learned times have been inclined to atheism, and how the contemplation of second causes doth derogate from our dependence upon God, who is the first cause.

To discover then the ignorance and error of this opinion and the misunderstanding in the grounds thereof, it may well appear these men do not observe or consider that it was not the pure knowledge of nature and universality, a knowledge by the light whereof man did give names unto other creatures in Paradise, as they were brought before him, according unto

of Learning to it, he retained the former part, yet he marks it in the translation as comparatively unimportant; adding with regard to the first, *quæ levior est, neque tamen ullo modo prætermittenda*, and with regard to the second, *quod caput rei est.*

their proprieties, which gave the occasion to the fall; but it was the proud knowledge of good and evil, with an intent in man to give law unto himself and to depend no more upon God's commandments, which was the form of the temptation. Neither is it any quantity of knowledge how great soever that can make the mind of man to swell; for nothing can fill, much less extend, the soul of man, but God and the contemplation of God; and therefore Salomon speaking of the two principal senses of inquisition, the eye and the ear, affirmeth that the eye is never satisfied with seeing, nor the ear with hearing; and if there be no fulness, then is the continent greater than the content: so of knowledge itself and the mind of man, whereto the senses are but reporters, he defineth likewise in these words, placed after that calendar or ephemerides which he maketh of the diversities of times and seasons for all actions and purposes; and concludeth thus: *God hath made all things beautiful, or decent, in the true return of their seasons: Also he hath placed the world in man's heart, yet cannot man find out the work which God worketh from the beginning to the end:* declaring not obscurely that God hath framed the mind of man as a mirror or glass capable of the image of the universal world, and joyful to receive the impression thereof, as the eye joyeth to receive light; and not only delighted in beholding the variety of things and vicissitude of times, but raised also to find out and discern the ordinances and decrees which throughout all those changes are infallibly observed. And although he doth insinuate that the supreme or summary law of nature, which he calleth *the work which God worketh from the beginning to the end,* is not possible to be found out by man; yet that doth not derogate from the capacity of the mind, but may be referred to the impediments, as of shortness of life, ill conjunction of labours, ill tradition of knowledge over from hand to hand, and many other inconveniences whereunto the condition of man is subject. For that nothing parcel of the world is denied to man's inquiry and invention he doth in another place rule over, when he saith, *The spirit of man is as the lamp of God, wherewith he searcheth the inwardness of all secrets.* If then such be the capacity and receit of the mind of man, it is manifest that there is no danger at all in the proportion or quantity of knowledge, how large soever, lest it should make it swell or

out-compass itself; no, but it is merely the quality of knowledge, which be it in quantity more or less, if it be taken without the true corrective thereof, hath in it some nature of venom or malignity, and some effects of that venom, which is ventosity or swelling. This corrective spice, the mixture whereof maketh knowledge so sovereign, is Charity, which the apostle immediately addeth to the former clause; for so he saith, *knowledge bloweth up, but charity buildeth up;* not unlike unto that which he delivereth in another place: *If I spake* (saith he) *with the tongues of men and angels, and had not charity, it were but as a tinkling cymbal;* not but that it is an excellent thing to speak with the tongues of men and angels, but because if it be severed from charity, and not referred to the good of men and mankind, it hath rather a sounding and unworthy glory than a meriting and substantial virtue. And as for that censure of Salomon concerning the excess of writing and reading books and the anxiety of spirit which redoundeth from knowledge, and that admonition of St. Paul, *That we be not seduced by vain philosophy;* let those places be rightly understood, and they do indeed excellently set forth the true bounds and limitations whereby human knowledge is confined and circumscribed; and yet without any such contracting or coarctation, but that it may comprehend all the universal nature of things. For these limitations are three. The first, *that we do not so place our felicity in knowledge, as we forget our mortality.* The second, *that we make application of our knowledge to give ourselves repose and contentment, and not distaste or repining.* The third, *that we do not presume by the contemplation of nature to attain to the mysteries of God.* For as touching the first of these, Salomon doth excellently expound himself in another place of the same book, where he saith; *I saw well that knowledge recedeth as far from ignorance as light doth from darkness, and that the wise man's eyes keep watch in his head, whereas the fool roundeth about in darkness: but withal I learned that the same mortality involveth them both.* And for the second, certain it is, there is no vexation or anxiety of mind which resulteth from knowledge otherwise than merely by accident; for all knowledge and wonder (which is the seed of knowledge) is an impression of pleasure in itself: but when men fall to framing conclusions out of their knowledge, applying it to their particular, and ministering to themselves

thereby weak fears or vast desires, there groweth that carefulness and trouble of mind which is spoken of: for then knowledge is no more *Lumen siccum* [a dry light], whereof Heraclitus the profound said, *Lumen siccum optima anima*[1], [the dry light is the best soul;] but it becometh *Lumen madidum* or *maceratum*, [a light charged with moisture,] being steeped and infused in the humours of the affections. And as for the third point, it deserveth to be a little stood upon and not to be lightly passed over: for if any man shall think by view and inquiry into these sensible and material things to attain that light whereby he may reveal unto himself the nature or will of God, then indeed is he spoiled by vain philosophy: for the contemplation of God's creatures and works produceth (having regard to the works and creatures themselves) knowledge; but having regard to God, no perfect knowledge, but wonder, which is broken knowledge. And therefore it was most aptly said by one of Plato's school, *That the sense of man carrieth a resemblance with the sun, which (as we see) openeth and revealeth all the terrestrial globe; but then again it obscureth and concealeth the stars and celestial globe: so doth the sense discover natural things, but it darkeneth and shutteth up divine.* And hence it is true that it hath proceeded that divers great learned men have been heretical, whilst they have sought to fly up to the secrets of the Deity by the waxen wings of the senses. And as for the conceit that too much knowledge should incline a man to atheism, and that the ignorance of second causes should make a more devout dependence upon God which is the first cause; first, it is good to ask the question which Job asked of his friends, *Will you lie for God, as one man will do for another, to gratify him?* For certain it is that God worketh nothing in nature but by second causes; and if they would have it otherwise believed, it is mere imposture, as it were in favour towards God; and nothing else but to offer to the author of truth the unclean sacrifice of a lie. But farther, it is an assured truth and a conclusion of experience, that a little or superficial knowledge of philosophy may incline the mind of man to atheism, but a farther proceeding therein doth bring the mind

[1] *αὐγὴ ξηρὴ ψυχὴ σοφωτάτη*: a corruption, according to the conjecture of Professor W.H. Thompson, of *αὕη ψυχὴ σοφωτάτη*; *ξηρὴ* having been first inserted by one commentator, to explain the unusual word *αὕη*, and so passed into the text; *αὕη* having been turned into *αὐγὴ* by another, to make sense. See *Remains of Professor Archer Butler*, vol. i. p. 314.

back again to religion; for in the entrance of philosophy, when the second causes, which are next unto the senses, do offer themselves to the mind of man, if it dwell and stay there, it may induce some oblivion of the highest cause; but when a man passeth on farther, and seeth the dependence of causes and the works of Providence; then, according to the allegory of the poets, he will easily believe that the highest link of nature's chain must needs be tied to the foot of Jupiter's chair. To conclude therefore, let no man, upon a weak conceit of sobriety or an ill-applied moderation, think or maintain that a man can search too far or be too well studied in the book of God's word or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both; only let men beware that they apply both to charity, and not to swelling; to use, and not to ostentation; and again, that they do not unwisely mingle or confound these learnings together.

And as for the disgraces which learning receiveth from politiques, they be of this nature; that learning doth soften men's minds, and makes them more unapt for the honour and exercise of arms; that it doth mar and pervert men's dispositions for matter of government and policy, in making them too curious and irresolute by variety of reading, or too peremptory or positive by strictness of rules and axioms, or too immoderate and overweening by reason of the greatness of examples, or too incompatible and differing from the times by reason of the dissimilitude of examples; or at least that it doth divert men's travails from action and business, and bringeth them to a love of leisure and privateness; and that it doth bring into states a relaxation of discipline, whilst every man is more ready to argue than to obey and execute. Out of this conceit Cato surnamed the Censor, one of the wisest men indeed that ever lived, when Carneades the philosopher came in embassage to Rome, and that the young men of Rome began to flock about him, being allured with the sweetness and majesty of his eloquence and learning, gave counsel in open senate that they should give him his dispatch with all speed, lest he should infect and inchant the minds and affections of the youth, and at unawares bring in an alteration of the manners and customs of the state. Out of the same conceit or humour did Virgil,

turning his pen to the advantage of his country and the disadvantage of his own profession, make a kind of separation between policy and government and between arts and sciences, in the verses so much renowned, attributing and challenging the one to the Romans, and leaving and yielding the other to the Grecians; *Tu regere imperio populos, Romane, memento, Hæ tibi erunt artes*, &c.

[Be thine, O Rome,
With arts of government to rule the nations.]

So likewise we see that Anytus, the accuser of Socrates, laid it as an article of charge and accusation against him that he did with the variety and power of his discourses and disputations withdraw young men from due reverence to the laws and customs of their country; and that he did profess a dangerous and pernicious science, which was to make the worse matter seem the better, and to suppress truth by force of eloquence and speech.

But these and the like imputations have rather a countenance of gravity than any ground of justice: for experience doth warrant that both in persons and in times there hath been a meeting and concurrence in learning and arms, flourishing and excelling in the same men and the same ages. For as for men, there cannot be a better nor the like instance, as of that pair, Alexander the Great and Julius Cæsar the dictator; whereof the one was Aristotle's scholar in philosophy, and the other was Cicero's rival in eloquence; or if any man had rather call for scholars that were great generals than generals that were great scholars, let him take Epaminondas the Theban, or Xenophon the Athenian; whereof the one was the first that abated the power of Sparta, and the other was the first that made way to the overthrow of the monarchy of Persia. And this concurrence is yet more visible in times than in persons, by how much an age is greater object than a man. For both in Ægypt, Assyria, Persia, Græcia, and Rome, the same times that are most renowned for arms are likewise most admired for learning; so that the greatest authors and philosophers and the greatest captains and governors have lived in the same ages. Neither can it otherwise be: for as in man the ripeness of strength of the body and mind cometh much about an age, save that the strength of the body cometh somewhat the more early; so in states, arms and learning, whereof the one correspondeth

to the body, the other to the soul of man, have a concurrence or near sequence in times.

And for matter of policy and government, that learning should rather hurt than enable thereunto, is a thing very improbable. We see it is accounted an error to commit a natural body to empiric physicians, which commonly have a few pleasing receits whereupon they are confident and adventurous, but know neither the causes of diseases, nor the complexions of patients, nor peril of accidents, nor the true method of cures. We see it is a like error to rely upon advocates or lawyers which are only men of practice and not grounded in their books, who are many times easily surprised when matter falleth out besides their experience, to the prejudice of the causes they handle. So by like reason it cannot be but a matter of doubtful consequence, if states be managed by empiric statesmen, not well mingled with men grounded in learning. But contrariwise, it is almost without instance contradictory, that ever[1] any government was disastrous that was in the hands of learned governors. For howsoever it hath been ordinary with politic men to extenuate and disable learned men by the names of *Pedantes;* yet in the records of time it appeareth in many particulars, that the governments of princes in minority (notwithstanding the infinite disadvantage of that kind of state) have nevertheless excelled the government of princes of mature age, even for that reason which they seek to traduce, which is, that by that occasion the state hath been in the hands of *Pedantes:* for so was the state of Rome for the first five years, which are so much magnified, during the minority of Nero, in the hands of Seneca, a *Pedanti:* so it was again for ten years space or more, during the minority of Gordianus the younger, with great applause and contentation in the hands of Misitheus, a *Pedanti:* so was it before that, in the minority of Alexander Severus, in like happiness, in hands not much unlike, by reason of the rule of the women, who were aided by the teachers and preceptors. Nay let a man look into the government of the bishops of Rome, as by name into the government of Pius Quintus and Sextus Quintus in our times, who were both at their entrance esteemed but as pedantical friars, and he shall find that such popes do greater things, and proceed upon

[1] So in all the editions.

truer principles of estate, than those which have ascended to the papacy from an education and breeding in affairs of estate and courts of princes; for although men bred in learning are perhaps to seek in points of convenience and accommodating for the present, which the Italians call *ragioni di stato*, whereof the same Pius Quintus could not hear spoken with patience, terming them inventions against religion and the moral virtues; yet on the other side, to recompense that, they are perfect in those same plain grounds of religion, justice, honour, and moral virtue; which if they be well and watchfully pursued, there will be seldom use of those other, no more than of physic in a sound or well-dieted body. Neither can the experience of one man's life furnish examples and precedents for the events of one man's life: for as it happeneth sometimes that the grandchild or other descendant resembleth the ancestor more than the son; so many times occurrences of present times may sort better with ancient examples than with those of the later or immediate times: and lastly, the wit of one man can no more countervail learning than one man's means can hold way with a common purse.

And as for those particular seducements or indispositions of the mind for policy and government, which learning is pretended to insinuate; if it be granted that any such thing be, it must be remembered withal, that learning ministereth in every of them greater strength of medicine or remedy, than it offereth cause of indisposition or infirmity. For if by a secret operation it make men perplexed and irresolute, on the other side by plain precept it teacheth them when and upon what ground to resolve; yea, and how to carry things in suspense without prejudice till they resolve. If it make men positive and regular, it teacheth them what things are in their nature demonstrative, and what are conjectural; and as well the use of distinctions and exceptions, as the latitude of principles and rules. If it mislead by disproportion or dissimilitude of examples, it teacheth men the force of circumstances, the errors of comparisons, and all the cautions of application; so that in all these it doth rectify more effectually than it can pervert. And these medicines it conveyeth into men's minds much more forcibly by the quickness and penetration of examples. For let a man look into the errors of Clement the seventh, so lively described by Guicciardine, who served under him, or

into the errors of Cicero painted out by his own pencil in his epistles to Atticus, and he will fly apace from being irresolute. Let him look into the errors of Phocion, and he will beware how he be obstinate or inflexible. Let him but read the fable of Ixion, and it will hold him from being vaporous or imaginative. Let him look into the errors of Cato the second, and he will never be one of the Antipodes, to tread opposite to the present world.

And for the conceit that learning should dispose men to leisure and privateness, and make men slothful; it were a strange thing if that which accustometh the mind to a perpetual motion and agitation should induce slothfulness; whereas contrariwise it may be truly affirmed that no kind of men love business for itself but those that are learned; for other persons love it for profit, as an hireling that loves the work for the wages; or for honour, as because it beareth them up in the eyes of men, and refresheth their reputation which otherwise would wear; or because it putteth them in mind of their fortune, and giveth them occasion to pleasure and displeasure; or because it exerciseth some faculty wherein they take pride, and so entertaineth them in good humour and pleasing conceits toward themselves; or because it advanceth any other their ends. So that as it is said of untrue valours that some men's valours are in the eyes of them that look on, so such men's industries are in the eyes of others, or at least in regard of their own designments[1]; only learned men love business as an action according to nature, as agreeable to health of mind as exercise is to health of body, taking pleasure in the action itself, and not in the purchase: so that of all men they are the most indefatigable, if it be towards any business which can hold or detain their mind.

And if any man be laborious in reading and study and yet idle in business and action, it groweth from some weakness of body or softness of spirit, such as Seneca speaketh of; *Quidam tam sunt umbratiles, ut putent in turbido esse quicquid in luce est*, [there are some men so fond of the shade, that they think they are in trouble whenever they are in the light;] and not of learning. Well may it be that such a point of a man's nature

[1] *i. e.* they have for their object either the applause of others or some inward gratification of their own. (*hoc videntur agere, aut ut alii plaudant, aut ut ipsi intra se gestiant.*

may make him give himself to learning, but it is not learning that breedeth any such point in his nature.

And that learning should take up too much time or leisure; I answer, the most active or busy man that hath been or can be hath (no question) many vacant times of leisure, while he expecteth the tides and returns of business, (except he be either tedious and of no dispatch, or lightly and unworthily ambitious to meddle in things that may be better done by others;) and then the question is but how those spaces and times of leisure shall be filled and spent; whether in pleasures or in studies; as was well answered by Demosthenes to his adversary Æschines[1], that was a man given to pleasure, and told him *that his orations did smell of the lamp: Indeed* (said Demosthenes) *there is a great difference between the things that you and I do by lamp-light.* So as no man need doubt that learning will expulse business; but rather it will keep and defend the possession of the mind against idleness and pleasure, which otherwise at unawares may enter to the prejudice of both.

Again, for that other conceit that learning should undermine the reverence of laws and government, it is assuredly a mere depravation and calumny without all shadow of truth. For to say that a blind custom of obedience should be a surer obligation than duty taught and understood, it is to affirm that a blind man may tread surer by a guide than a seeing man can by a light. And it is without all controversy that learning doth make the minds of men gentle, generous, maniable, and pliant to government; whereas ignorance makes them churlish, thwart, and mutinous: and the evidence of time doth clear this assertion, considering that the most barbarous, rude, and unlearned times have been most subject to tumults, seditions, and changes.

And as to the judgment of Cato the Censor, he was well punished for his blasphemy against learning, in the same kind wherein he offended; for when he was past threescore years old, he was taken with an extreme desire to go to school again and to learn the Greek tongue, to the end to peruse the Greek authors; which doth well demonstrate, that his former censure of the Grecian learning was rather an affected gravity, than according to the inward sense of his own opinion. And as for Virgil's verses, though it pleased him to brave the

[1] Pytheas, according to Plutarch.

world in taking to the Romans the art of empire, and leaving to others the arts of subjects; yet so much is manifest, that the Romans never ascended to that height of empire till the time they had ascended to the height of other arts; for in the time of the two first Cæsars, which had the art of government in greatest perfection, there lived the best poet, Virgilius Maro; the best historiographer, Titus Livius; the best antiquary, Marcus Varro; and the best, or second orator, Marcus Cicero, that to the memory of man are known. As for the accusation of Socrates, the time must be remembered when it was prosecuted; which was under the thirty tyrants, the most base, bloody, and envious persons that have governed; which revolution of state was no sooner over, but Socrates, whom they had made a person criminal, was made a person heroical, and his memory accumulate with honours divine and human; and those discourses of his, which were then termed corrupting of manners, were after acknowledged for sovereign medicines of the mind and manners, and so have been received ever since till this day. Let this therefore serve for answer to politiques, which in their humorous severity or in their feigned gravity have presumed to throw imputations upon learning; which redargution nevertheless (save that we know not whether our labours may extend to other ages) were not needful for the present, in regard of the love and reverence towards learning which the example and countenance of two so learned princes, queen Elizabeth and your Majesty, being as Castor and Pollux, *lucida sidera*, stars of excellent light and most benign influence, hath wrought in all men of place and authority in our nation.

Now therefore we come to that third sort of discredit or diminution of credit, that groweth unto learning from learned men themselves, which commonly cleaveth fastest. It is either from their fortune, or from their manners, or from the nature of their studies. For the first, it is not in their power; and the second is accidental; the third only is proper to be handled. But because we are not in hand with true measure, but with popular estimation and conceit, it is not amiss to speak somewhat of the two former. The derogations therefore which grow to learning from the fortune or condition of learned men, are either in respect of scarcity of means, or in respect of privateness of life and meanness of employments.

Concerning want, and that it is the case of learned men usually to begin with little and not to grow rich so fast as other men, by reason they convert not their labours chiefly to lucre and increase; it were good to leave the common place in commendation of poverty to some friar to handle [1], to whom much was attributed by Machiavel in this point, when he said, *That the kingdom of the clergy had been long before at an end, if the reputation and reverence towards the poverty of friars had not borne out the scandal of the superfluities and excesses of bishops and prelates.* So a man might say that the felicity and delicacy of princes and great persons had long since turned to rudeness and barbarism, if the poverty of learning had not kept up civility and honour of life. But without any such advantages, it is worthy the observation what a reverend and honoured thing poverty of fortune was for some ages in the Roman state, which nevertheless was a state without paradoxes. For we see what Titus Livius saith in his introduction: *Cæterum aut me amor negotii suscepti fallit, aut nulla unquam respublica nec major, nec sanctior, nec bonis exemplis ditior fuit; nec in quam tam seræ avaritia luxuriaque immigraverint; nec ubi tantus ac tam diu paupertati ac parsimoniæ honos fuerit:* [that if affection for his subject did not deceive him, there was never any state in the world either greater or purer or richer in good examples; never any into which avarice and luxury made their way so late; never any in which poverty and frugality were for so long a time held in so great honour]. We see likewise, after that the state of Rome was not itself but did degenerate, how that person that took upon him to be counsellor to Julius Cæsar after his victory, where to begin his restoration of the state, maketh it of all points the most summary to take away the estimation of wealth: *Verum hæc et omnia mala pariter cum honore pecuniæ desinent; si neque magistratus, neque alia vulgo cupienda, venalia erunt:* [but these and all other evils (he says) will cease as soon as the worship of money ceases; which will come to pass when neither magistracies nor other things that are objects of desire to the vulgar shall be to be had for money]. To conclude this point, as it was truly said that *rubor est virtutis color,* [a blush is virtue's colour,] though sometime it come from vice; so it may be fitly said that *paupertas est virtutis fortuna,* [poverty is virtue's for-

[1] Patribus mendicantibus (pace eorum dixerim).—*De Aug.*

tune,] though sometime it may proceed from misgovernment and accident. Surely Salomon hath pronounced it, both in censure, *Qui festinat ad divitias non erit insons,* [he that maketh haste to be rich shall not be innocent;] and in precept, *Buy the truth, and sell it not; and so of wisdom and knowledge;* judging that means were to be spent upon learning, and not learning to be applied to means. And as for the privateness or obscureness (as it may be in vulgar estimation accounted) of life of contemplative men; it is a theme so common to extol a private life, not taxed with sensuality and sloth, in comparison and to the disadvantage of a civil life, for safety, liberty, pleasure, and dignity, or at least freedom from indignity, as no man handleth it but handleth it well; such a consonancy it hath to men's conceits in the expressing and to men's consents in the allowing. This only I will add, that learned men forgotten in states, and not living in the eyes of men, are like the images of Cassius and Brutus in the funeral of Junia; of which not being represented, as many others were, Tacitus saith, *Eo ipso præfulgebant, quod non visebantur;* [they had the preeminence over all — in being left out].

And for meanness of employment, that which is most traduced to contempt is that the government of youth is commonly allotted to them; which age, because it is the age of least authority, it is transferred to the disesteeming of those employments wherein youth is conversant, and which are conversant about youth. But how unjust this traducement is (if you will reduce things from popularity of opinion to measure of reason) may appear in that we see men are more curious what they put into a new vessel than into a vessel seasoned, and what mould they lay about a young plant than about a plant corroborate; so as the weakest terms and times of all things use to have the best applications and helps. And will you hearken to the Hebrew Rabbins? *Your young men shall see visions, and your old men shall dream dreams;* say they [1] youth is the worthier age, for that visions are nearer apparitions of God than dreams. And let it be noted, that howsoever the conditions of life of *Pedantes* have [2] been scorned upon theatres, as the ape of tyranny; and that the modern looseness or negligence hath

[1] So the original. Edd. 1629 and 1633 have *the.* The meaning is, "upon this text they observe," &c. (*Ex hoc textu colligunt.*)

[2] So ed. 1633. The original has *hath.*

taken no due regard to the choice of school-masters and tutors; yet the ancient wisdom of the best times did always make a just complaint that states were too busy with their laws and too negligent in point of education: which excellent part of ancient discipline hath been in some sort revived of late times by the colleges of the Jesuits; of whom, although in regard of their superstition I may say, *quo meliores, eo deteriores*[1], [the better the worse;] yet in regard of this, and some other points concerning human learning and moral matters, I may say, as Agesilaus said to his enemy Pharnabazus, *talis quum sis, utinam noster esses*, [they are so good that I wish they were on our side]. And thus much touching the discredits drawn from the fortunes of learned men.

As touching the manners of learned men, it is a thing personal and individual: and no doubt there be amongst them, as in other professions, of all temperatures: but yet so as it is not without truth which is said, that *abeunt studia in mores*, studies have an influence and operation upon the manners of those that are conversant in them.[2]

But upon an attentive and indifferent review, I for my part cannot find any disgrace to learning can proceed from the manners of learned men; not inherent to them as they are learned[3]; except it be a fault (which was the supposed fault of Demosthenes, Cicero, Cato the second, Seneca, and many more) that because the times they read of are commonly better than the times they live in, and the duties taught better than the duties practised, they contend sometimes too far to bring things to perfection, and to reduce the corruption of manners to honesty of precepts or examples of too great height. And yet hereof they have caveats enough in their own walks. For Solon, when he was asked whether he had given his citizens the best laws, answered wisely, *Yea of such as they would*

[1] This parenthesis is omitted in the translation, no doubt as offensive to the Roman Catholics. Several other passages of the same kind occur in the *Advancement*, and they are all treated in the same way. The motive for which is sufficiently explained by Bacon himself in the letter which he sent to the King along with the *De Augmentis*. "I have been also (he says) mine own *Index Expurgatorius*, that it may be read in all places. For since my end of putting it into Latin was to have it read everywhere, it had been an absurd contradiction to free it in the language and to pen it up in the matter." Mr. Ellis made a list of these passages, which will be noticed in their places. The word *enemy* in the next clause is omitted, probably from the same motive.

[2] And that learning (the translation adds), unless the mind into which it enters be much depraved, corrects the natural disposition and changes it for the better.

[3] *i. e.* not [I mean, from such manners as are] inherent, &c. (*nullum occurrit dedecus literis, ex literatorum moribus, quatenus sunt literati, adhærens.*)

receive: and Plato, finding that his own heart could not agree with the corrupt manners of his country, refused to bear place or office; saying, *That a man's country was to be used as his parents were, that is, with humble persuasions, and not with contestations:* and Cæsar's counsellor put in the same caveat, *Non ad vetera instituta revocans quæ jampridem corruptis moribus ludibrio sunt:* [not to attempt to bring things back to the original institution, now that by reason of the corruption of manners the ancient simplicity and purity had fallen into contempt:] and Cicero noteth this error directly in Cato the second, when he writes to his friend Atticus; *Cato optime sentit, sed nocet interdum reipublicæ; loquitur enim tanquam in republica Platonis, non tanquam in fæce Romuli:* [Cato means excellently well; but he does hurt sometimes to the state; for he talks as if it were Plato's republic that we are living in, and not the dregs of Romulus:] and the same Cicero doth excuse and expound the philosophers for going too far and being too exact in their prescripts, when he saith, *Isti ipsi præceptores virtutis et magistri videntur fines officiorum paulo longius quam natura vellet protulisse, ut cum ad ultimum animo contendissemus, ibi tamen, ubi oportet, consisteremus:* [that they had set the points of duty somewhat higher than nature would well bear; meaning belike to allow for shortcomings, and that our endeavours aiming beyond the mark and falling short, should light at the right place:] and yet himself might have said, *Monitis sum minor ipse meis,* [that he fell short of his own precepts]; for it was his own fault, though not in so extreme a degree.

Another fault likewise much of this kind hath been incident to learned men; which is, that they have esteemed the preservation, good, and honour of their countries or masters before their own fortunes or safeties. For so saith Demosthenes unto the Athenians: *If it please you to note it, my counsels unto you are not such whereby I should grow great amongst you, and you become little amongst the Grecians: but they be of that nature, as they are sometimes not good for me to give, but are always good for you to follow.* And so Seneca, after he had consecrated that *Quinquennium Neronis* to the eternal glory of learned governors, held on his honest and loyal course of good and free counsel, after his master grew extremely corrupt in his government. Neither can this point otherwise be; for learning endueth men's minds with a true sense of the frailty of their

persons, the casualty of their fortunes, and the dignity of their soul and vocation; so that it is impossible for them to esteem that any greatness of their own fortune can be a true or worthy end of their being and ordainment; and therefore are desirous to give their account to God, and so likewise to their masters under God (as kings and the states that they serve), in these words; *Ecce tibi lucrefeci*, and not *Ecce mihi lucrefeci*, ['Lo, I have gained for thee,' not 'Lo, I have gained for myself:'] whereas the corrupter sort of mere politiques, that have not their thoughts established by learning in the love and apprehension of duty, nor never look abroad into universality, do refer all things to themselves, and thrust themselves into the centre of the world, as if all lines should meet in them and their fortunes; never caring in all tempests what becomes of the ship of estates, so they may save themselves in the cockboat of their own fortune; whereas men that feel the weight of duty, and know the limits of self-love, use to make good their places and duties, though with peril. And if they stand in seditious and violent alterations, it is rather the reverence which many times both adverse parts do give to honesty, than any versatile advantage of their own carriage. But for this point of tender sense and fast obligation of duty, which learning doth endue the mind withal, howsoever fortune may tax it and many in the depth of their corrupt principles may despise it, yet it will receive an open allowance, and therefore needs the less disproof or excusation.

Another fault incident commonly to learned men, which may be more probably defended than truly denied, is that they fail sometimes in applying themselves to particular persons; which want of exact application ariseth from two causes; the one, because the largeness of their mind can hardly confine itself to dwell in the exquisite observation or examination of the nature and customs of one person: for it is a speech for a lover and not for a wise man, *Satis magnum alter alteri theatrum sumus*, [each is to other a theatre large enough]. Nevertheless I shall yield, that he that cannot contract the sight of his mind as well as disperse and dilate it, wanteth a great faculty. But there is a second cause, which is no inability but a rejection upon choice and judgment. For the honest and just bounds of observation by one person upon another extend no farther but to understand him sufficiently, whereby not to give him offence,

or whereby to be able to give him faithful counsel, or whereby to stand upon reasonable guard and caution in respect of a man's self: but to be speculative into another man, to the end to know how to work him or wind him or govern him, proceedeth from a heart that is double and cloven, and not entire and ingenuous; which as in friendship it is want of integrity, so towards princes or superiors is want of duty. For the custom of the Levant, which is, that subjects do forbear to gaze or fix their eyes upon princes, is in the outward ceremony barbarous; but the moral is good: for men ought not by cunning and bent observations to pierce and penetrate into the hearts of kings, which the Scripture hath declared to be inscrutable.

There is yet another fault (with which I will conclude this part) which is often noted in learned men, that they do many times fail to observe decency and discretion in their behaviour and carriage, and commit errors in small and ordinary points of action; so as the vulgar sort of capacities do make a judgment of them in greater matters by that which they find wanting in them in smaller. But this consequence doth oft deceive men; for which I do refer them over to that which was said by Themistocles, arrogantly and uncivilly being applied to himself out of his own mouth, but being applied to the general state of this question pertinently and justly; when being invited to touch a lute, he said *he could not fiddle, but he could make a small town a great state.* So no doubt many may be well seen in the passages of government and policy, which are to seek in little and punctual occasions. I refer them also to that which Plato said of his master Socrates, whom he compared to the gallypots of apothecaries, which on the outside had apes and owls and antiques, but contained within sovereign and precious liquors and confections; acknowledging that to an external report he was not without superficial levities and deformities, but was inwardly replenished with excellent virtues and powers. And so much touching the point of manners of learned men.

But in the mean time I have no purpose to give allowance to some conditions and courses base and unworthy, wherein divers professors of learning have wronged themselves and gone too far; such as were those trencher philosophers, which in the later age of the Roman state were usually in the houses of

great persons, being little better than solemn parasites; of which kind, Lucian maketh a merry description of the philosopher that the great lady took to ride with her in her coach, and would needs have him carry her little dog, which he doing officiously and yet uncomely, the page scoffed, and said, *That he doubted the philosopher of a Stoic would turn to be a Cynic.* But above all the rest, the gross and palpable flattery whereunto many (not unlearned) have abased and abused their wits and pens, turning (as Du Bartas saith) Hecuba into Helena and Faustina into Lucretia, hath most diminished the price and estimation of learning. Neither is the moral[1] dedications of books and writings, as to patrons, to be commended: for that books (such as are worthy the name of books) ought to have no patrons but truth and reason; and the ancient custom was to dedicate them only to private and equal friends, or to intitle the books with their names; or if to kings and great persons, it was to some such as the argument of the book was fit and proper for. But these and the like courses may deserve rather reprehension than defence.

Not that I can tax or condemn the morigeration or application of learned men to men in fortune. For the answer was good that Diogenes made to one that asked him in mockery, *How it came to pass that philosophers were the followers of rich men, and not rich men of philosophers?* He answered soberly, and yet sharply, *Because the one sort knew what they had need of, and the other did not.* And of the like nature was the answer which Aristippus made, when having a petition to Dionysius and no ear given to him, he fell down at his feet, whereupon Dionysius staid and gave him the hearing and granted it; and afterward some person tender on the behalf of philosophy, reproved Aristippus that he would offer the profession of philosophy such an indignity, as for a private suit to fall at a tyrant's feet: but he answered, *It was not his fault, but it was the fault of Dionysius, that had his ears in his feet.* Neither was it accounted weakness, but discretion, in him that would not dispute his best with Adrianus Cæsar; excusing himself, *That it was reason to yield to him that commanded thirty legions.* These and the like applications and stooping to points of necessity and convenience cannot be disallowed; for though

[1] *i. e.* customary. *Morem illum receptum libros patronis nuncupandi.* — De Aug. Ed. 1629 has *moderne.*

they may have some outward baseness, yet in a judgment truly made they are to be accounted submissions to the occasion and not to the person.

Now I proceed to those errors and vanities which have intervened amongst the studies themselves of the learned; which is that which is principal and proper to the present argument; wherein my purpose is not to make a justification of the errors, but, by a censure and separation of the errors, to make a justification of that which is good and sound, and to deliver that from the aspersion of the other. For we see that it is the manner of men to scandalize and deprave that which retaineth the state and virtue, by taking advantage upon that which is corrupt and degenerate: as the Heathens in the primitive church used to blemish and taint the Christians with the faults and corruptions of heretics. But nevertheless I have no meaning at this time to make any exact animadversion of the errors and impediments in matters of learning which are more secret and remote from vulgar opinion; but only to speak unto such as do fall under, or near unto, a popular observation.

There be therefore chiefly three vanities in studies, whereby learning hath been most traduced. For those things we do esteem vain, which are either false or frivolous, those which either have no truth or no use: and those persons we esteem vain, which are either credulous or curious; and curiosity is either in matter or words: so that in reason as well as in experience, there fall out to be these three distempers (as I may term them) of learning; the first, fantastical learning; the second, contentious learning; and the last, delicate learning; vain imaginations, vain altercations, and vain affectations; and with the last I will begin.[1] Martin Luther, conducted (no doubt) by an higher Providence, but in discourse of reason finding what a province he had undertaken against the Bishop of Rome and the degenerate traditions of the church, and finding his own solitude, being no ways aided by the opinions

[1] The passage which follows is much curtailed in the translation; no doubt for the reason mentioned in note p. 277. All allusion to the "higher Providence," the "degenerate traditions" of the church, the study of the ancient authors, and the "primitive but seeming new opinions" is left out: and we are only told that this distemper of luxuriance of speech (though in former times it had been occasionally in request) began to prevail very much about the time of Luther; chiefly on account of the demand for fervour and efficacy of preaching, &c. The remarks on the style of the schoolmen, and the hatred which at that time began to be conceived against them are retained.

of his own time, was enforced to awake all antiquity, and to call former times to his succors to make a party against the present time; so that the ancient authors, both in divinity and in humanity, which had long time slept in libraries, began generally to be read and revolved. This by consequence did draw on a necessity of a more exquisite travail in the languages original wherein those authors did write, for the better understanding of those authors and the better advantage of pressing and applying their words. And thereof grew again a delight in their manner of style and phrase, and an admiration of that kind of writing; which was much furthered and precipitated by the enmity and opposition that the propounders of those (primitive but seeming new) opinions had against the schoolmen; who were generally of the contrary part, and whose writings were altogether in a differing style and form; taking liberty to coin and frame new terms of art to express their own sense and to avoid circuit of speech, without regard to the pureness, pleasantness, and (as I may call it) lawfulness of the phrase or word. And again, because the great labour then [1] was with the people, (of whom the Pharisees were wont to say, *Execrabilis ista turba, quæ non novit legem,*) [the wretched crowd that has not known the law,] for the winning and persuading of them, there grew of necessity in chief price and request eloquence and variety of discourse, as the fittest and forciblest access into the capacity of the vulgar sort. So that these four causes concurring, the admiration of ancient authors, the hate of the schoolmen, the exact study of languages, and the efficacy of preaching, did bring in an affectionate study of eloquence and copie of speech, which then began to flourish. This grew speedily to an excess; for men began to hunt more after words than matter; and more after the choiceness of the phrase, and the round and clean composition of the sentence, and the sweet falling of the clauses, and the varying and illustration of their works with tropes and figures, than after the weight of matter, worth of subject, soundness of argument, life of invention, or depth of judgment. Then grew the flowing and watery vein of Osorius, the Portugal bishop, to be in price. Then did Sturmius spend such infinite and curious pains upon Cicero the orator and Hermogenes the rhetorician, besides his own

[1] So edd. 1629 and 1633. The original has *that then*.

books of periods and imitation and the like. Then did Car of Cambridge, and Ascham, with their lectures and writings, almost deify Cicero and Demosthenes, and allure all young men that were studious unto that delicate and polished kind of learning. Then did Erasmus take occasion to make the scoffing echo; *Decem annos consumpsi in legendo Cicerone,* [I have spent ten years in reading Cicero:] and the echo answered in Greek, *one, Asine.* Then grew the learning of the schoolmen to be utterly despised as barbarous. In sum, the whole inclination and bent of those times was rather towards copie than weight.

Here therefore [is] the first distemper of learning, when men study words and not matter: whereof though I have represented an example of late times, yet it hath been and will be *secundum majus et minus* in all time. And how is it possible but this should have an operation to discredit learning, even with vulgar capacities, when they see learned men's works like the first letter of a patent or limned book; which though it hath large flourishes, yet it is but a letter? It seems to me that Pygmalion's frenzy is a good emblem or portraiture of this vanity: for words are but the images of matter; and except they have life of reason and invention, to fall in love with them is all one as to fall in love with a picture.

But yet notwithstanding it is a thing not hastily to be condemned, to clothe and adorn the obscurity even of philosophy itself with sensible and plausible elocution. For hereof we have great examples in Xenophon, Cicero, Seneca, Plutarch, and of Plato also in some degree; and hereof likewise there is great use; for surely to the severe inquisition of truth, and the deep progress into philosophy, it is some hinderance; because it is too early satisfactory to the mind of man, and quencheth the desire of further search, before we come to a just period; but then if a man be to have any use of such knowledge in civil occasions, of conference, counsel, persuasion, discourse, or the like; then shall he find it prepared to his hands in those authors which write in that manner. But the excess of this is so justly contemptible, that as Hercules, when he saw the image of Adonis, Venus' minion, in a temple, said in disdain, *Nil sacri es,* [you are no divinity;] so there is none of Hercules' followers in learning, that is, the more severe and laborious sort of inquirers into truth, but will despise those

delicacies and affectations, as indeed capable of no divineness.[1] And thus much of the first disease or distemper of learning.

The second, which followeth, is in nature worse than the former; for as substance of matter is better than beauty of words, so contrariwise vain matter is worse than vain words: wherein it seemeth the reprehension of St. Paul was not only proper for those times, but prophetical for the times following; and not only respective to divinity, but extensive to all knowledge: *Devita profanas vocum novitates, et oppositiones falsi nominis scientiæ:* [shun profane novelties of terms and oppositions of science falsely so called]. For he assigneth two marks and badges of suspected and falsified science; the one, the novelty and strangeness of terms; the other, the strictness of positions, which of necessity doth induce oppositions, and so questions and altercations. Surely, like as many substances in nature which are solid do putrefy and corrupt into worms, so it is the property of good and sound knowledge to putrefy and dissolve into a number of subtile, idle, unwholesome, and (as I may term them) vermiculate questions, which have indeed a kind of quickness and life of spirit, but no soundness of matter or goodness of quality. This kind of degenerate learning did chiefly reign amongst the schoolmen; who having sharp and strong wits, and abundance of leisure, and small variety of reading; but their wits being shut up in the cells of a few authors (chiefly Aristotle their dictator) as their persons were shut up in the cells of monasteries and colleges; and knowing little history, either of nature or time; did out of no great quantity of matter, and infinite agitation of wit, spin out unto us those laborious webs of learning which are extant in their books. For the wit and mind of man, if it work upon matter, which is the contemplation of the creatures of God, worketh according to the stuff, and is limited thereby; but if it work upon itself, as the spider worketh his web, then it is

[1] In the translation he mentions another vanity of style, though not of so bad a kind, as commonly succeeding the last in point of time,—a style in which all the study is to have the words pointed, the sentences concise, and the whole composition rather twisted into shape than allowed to flow (*oratio denique potius versa quam fusa*): a trick which has the effect of making everything seem more ingenious than it really is. Such a style (he says) is found largely in Seneca, less in Tacitus and the second Pliny, and has found favour of late with the ears of our own time; but though it is agreeable to ordinary understandings and so procures some respect for literature, yet to more exact judgments it is deservedly distasteful, and may be set down among the distempers of learning, being, as well as the other, a kind of hunting after words and verbal prettiness.

endless, and brings forth indeed cobwebs of learning, admirable for the fineness of thread and work, but of no substance or profit.

This same unprofitable subtility or curiosity is of two sorts; either in the subject itself that they handle, when it is a fruitless speculation or controversy, (whereof there are no small number both in divinity and philosophy,) or in the manner or method of handling of a knowledge; which amongst them was this; upon every particular position or assertion to frame objections, and to those objections, solutions; which solutions were for the most part not confutations, but distinctions: whereas indeed the strength of all sciences is, as the strength of the old man's faggot, in the bond. For the harmony of a science, supporting each part the other, is and ought to be the true and brief confutation and suppression of all the smaller sort of objections; but on the other side, if you take out every axiom, as the sticks of the faggot, one by one, you may quarrel with them and bend them and break them at your pleasure: so that as was said of Seneca, *Verborum minutiis rerum frangit pondera*, [that he broke up the weight and mass of the matter by verbal points and niceties;] so a man may truly say of the schoolmen, *Quæstionum minutiis scientiarum frangunt soliditatem;* [they broke up the solidity and coherency of the sciences by the minuteness and nicety of their questions]. For were it not better for a man in a fair room to set up one great light, or branching candlestick of lights, than to go about with a small watch candle into every corner? And such is their method, that rests not so much upon evidence of truth proved by arguments, authorities, similitudes, examples, as upon particular confutations and solutions of every scruple, cavillation, and objection; breeding for the most part one question as fast it solveth another; even as in the former resemblance, when you carry the light into one corner, you darken the rest: so that the fable and fiction of Scylla seemeth to be a lively image of this kind of philosophy or knowledge; which was transformed into a comely virgin for the upper parts; but then *Candida succinctam latrantibus inguina monstris*, [there were barking monsters all about her loins:] so the generalities of the schoolmen are for a while good and proportionable; but then when you descend into their distinctions and decisions, instead of a fruitful womb for the use and benefit of man's life, they end

in monstrous altercations and barking questions. So as it is not possible but this quality of knowledge must fall under popular contempt, the people being apt to contemn truth upon occasion of controversies and altercations, and to think they are all out of their way which never meet: and when they see such digladiation about subtilities and matter of no use nor moment, they easily fall upon that judgment of Dionysius of Syracusa, *Verba ista sunt senum otiosorum*, [it is the talk of old men that have nothing to do].

Notwithstanding certain it is, that if those schoolmen to their great thirst of truth and unwearied travail of wit had joined variety and universality of reading and contemplation, they had proved excellent lights, to the great advancement of all learning and knowledge. But as they are, they are great undertakers indeed, and fierce with dark keeping [1]; but as in the inquiry of the divine truth their pride inclined to leave the oracle of God's word and to vanish in the mixture of their own inventions, so in the inquisition of nature they ever left the oracle of God's works and adored the deceiving and deformed images which the unequal mirror of their own minds or a few received authors or principles did represent unto them. And thus much for the second disease of learning.

For the third vice or disease of learning, which concerneth deceit or untruth, it is of all the rest the foulest; as that which doth destroy the essential form of knowledge, which is nothing but a representation of truth: for the truth of being and the truth of knowing are one, differing no more than the direct beam and the beam reflected. This vice therefore brancheth itself into two sorts; delight in deceiving, and aptness to be deceived; imposture and credulity; which, although they appear to be of a diverse nature, the one seeming to proceed of cunning, and the other of simplicity, yet certainly they do for the most part concur: for as the verse noteth,

Percontatorem fugito, nam garrulus idem est,

an inquisitive man is a prattler, so upon the like reason a credulous man is a deceiver: as we see it in fame, that he that

[1] That is, fierce from being kept in the dark; the allusion being, as we see more clearly from a corresponding passage in an early Latin fragment [*ferocitatem autem et confidentiam quæ illos qui pauca norunt sequi solet, (ut animalia in tenebris educata,)* &c.—*Cog. de Sci. Hum.* 1st fragm. § 10.], to the effect of darkness on the temper of animals.—*R. L. E.* The rest of this sentence, from "but as they are" is omitted in the translation. See note p. 277.

will easily believe rumours will as easily augment rumours and add somewhat to them of his own; which Tacitus wisely noteth, when he saith, *Fingunt simul creduntque*, [as fast as they believe one tale they make another [1]:] so great an affinity hath fiction and belief.

This facility of credit, and accepting or admitting things weakly authorized or warranted, is of two kinds, according to the subject: for it is either a belief of history (as [2] the lawyers speak, matter of fact), or else of matter of art and opinion. As to the former, we see the experience and inconvenience of this error in ecclesiastical history; which hath too easily received and registered reports and narrations of miracles wrought by martyrs, hermits, or monks of the desert, and other holy men, and their relics, shrines, chapels, and images [3]: which though they had a passage for a time, by the ignorance of the people, the superstitious simplicity of some, and the politic toleration of others, holding them but as divine poesies; yet after a period of time, when the mist began to clear up, they grew to be esteemed but as old wives' fables, impostures of the clergy, illusions of spirits, and badges of antichrist, to the great scandal and detriment of religion.

So in natural history, we see there hath not been that choice and judgment used as ought to have been; as may appear in the writings of Plinius, Cardanus, Albertus, and divers of the Arabians; being fraught with much fabulous matter, a great part not only untried but notoriously untrue, to the great derogation of the credit of natural philosophy with the grave and sober kind of wits. Wherein the wisdom and integrity of Aristotle is worthy to be observed; that having made so diligent and exquisite a history of living creatures, hath mingled it sparingly with any vain or feigned matter; and yet on the other side [4] hath cast all prodigious narrations which he thought worthy the recording into one book; excellently discerning that matter of manifest truth, such whereupon observation and rule was to be built, was not to be mingled or weakened with matter of doubtful credit; and yet again that

[1] I think this is the sense in which Bacon must have understood these words; but it is not the sense in which Tacitus employs them (An. v. 10.). He meant that they at once invented the tale and believed it: they "credited their own lie." — *J. S.*

[2] So the original. Edd. 1629 and 1633 have *or as*.

[3] The rest of the paragraph is omitted in the translation. See note p. 277.

[4] *Sake* in the original, and also in edd. 1629 and 1633.

rarities and reports that seem uncredible are not to be suppressed or denied to the memory of men.

And as for the facility of credit which is yielded to arts and opinions, it is likewise of two kinds; either when too much belief is attributed to the arts themselves, or to certain authors in any art. The sciences themselves which have had better intelligence and confederacy with the imagination of man than with his reason, are three in number; Astrology, Natural Magic, and Alchemy; of which sciences nevertheless the ends or pretences are noble. For astrology pretendeth to discover that correspondence or concatenation which is between the superior globe and the inferior: natural magic pretendeth to call and reduce natural philosophy from variety of speculations to the magnitude of works: and alchemy pretendeth to make separation of all the unlike parts of bodies which in mixtures of nature are incorporate. But the derivations and prosecutions to these ends, both in the theories and in the practices, are full of error and vanity; which the great professors themselves have sought to veil over and conceal by enigmatical writings, and referring themselves to auricular traditions, and such other devices to save the credit of impostures. And yet surely to alchemy this right is due, that it may be compared to the husbandman whereof Æsop makes the fable, that when he died told his sons that he had left unto them gold buried under ground in his vineyard; and they digged over all the ground, and gold they found none, but by reason of their stirring and digging the mould about the roots of their vines, they had a great vintage the year following: so assuredly the search and stir to make gold hath brought to light a great number of good and fruitful inventions and experiments, as well for the disclosing of nature as for the use of man's life.

And as for the overmuch credit that hath been given unto authors in sciences, in making them dictators, that their words should stand, and not counsels[1] to give advice; the damage is infinite that sciences have received thereby, as the principal cause that hath kept them low, at a stay without growth or advancement. For hence it hath comen that in arts mechanical the first deviser comes shortest, and time addeth and per-

[1] So the original. Edd. 1629 and 1633 have *consuls*. The translation has *dictatoria quadam potestate munivit ut edicant, non senatoria ut consulant*. Bacon probably wrote *counsell'*.

fecteth; but in sciences the first author goeth furthest, and time leeseth and corrupteth. So we see, artillery, sailing, printing, and the like, were grossly managed at the first, and by time accommodated and refined; but contrariwise the philosophies and sciences of Aristotle, Plato, Democritus, Hippocrates, Euclides, Archimedes, of most vigour at the first, and by time degenerate and imbased; whereof the reason is no other, but that in the former many wits and industries have contributed in one; and in the later many wits and industries have been spent about the wit of some one, whom many times they have rather depraved than illustrated. For as water will not ascend higher than the level of the first spring-head from whence it descendeth, so knowledge derived from Aristotle, and exempted from liberty of examination, will not rise again higher than the knowledge of Aristotle. And therefore, although the position be good, *Oportet discentem credere,* [a man who is learning must be content to believe what he is told,] yet it must be coupled with this, *Oportet edoctum judicare,* [when he has learned it he must exercise his judgment and see whether it be worthy of belief;] for disciples do owe unto masters only a temporary belief and a suspension of their own judgment until they be fully instructed, and not an absolute resignation or perpetual captivity: and therefore to conclude this point, I will say no more but, so let great authors have their due, as time which is the author of authors be not deprived of his due, which is further and further to discover truth. Thus have I gone over these three diseases of learning; besides the which, there are some other rather peccant humours than formed diseases, which nevertheless are not so secret and intrinsic but that they fall under a popular observation and traducement, and therefore are not to be passed over.

The first of these is the extreme affecting of two extremities; the one Antiquity, the other Novelty: wherein it seemeth the children of time do take after the nature and malice of the father. For as he devoureth his children, so one of them seeketh to devour and suppress the other; while antiquity envieth there should be new additions, and novelty cannot be content to add but it must deface. Surely the advice of the prophet is the true direction in this matter, *State super vias antiquas, et videte quænam sit via recta et bona, et ambulate in ea:* [stand ye in the old ways, and see which is the

good way, and walk therein]. Antiquity deserveth that reverence, that men should make a stand thereupon, and discover what is the best way; but when the discovery is well taken, then to make progression. And to speak truly, *Antiquitas sæculi juventus mundi.* These times are the ancient times, when the world is ancient, and not those which we account ancient *ordine retrogrado*, by a computation backward from ourselves.

Another error, induced by the former, is a distrust that any thing should be now to be found out, which the world should have missed and passed over so long time; as if the same objection were to be made to time that Lucian maketh to Jupiter and other the heathen gods, of which he wondereth that they begot so many children in old time and begot none in his time, and asketh whether they were become septuagenary, or whether the law *Pappia*, made against old men's marriages, had restrained them. So it seemeth men doubt lest time is become past children and generation; wherein contrariwise we see commonly the levity and unconstancy of men's judgments, which, till a matter be done, wonder that it can be done; and as soon as it is done, wonder again that it was no sooner done; as we see in the expedition of Alexander into Asia, which at first was prejudged as a vast and impossible enterprise; and yet afterwards it pleaseth Livy to make no more of it than this, *Nil aliud quàm bene ausus vana contemnere:* [it was but taking courage to despise vain apprehensions]. And the same happened to Columbus in the western navigation. But in intellectual matters it is much more common; as may be seen in most of the propositions of Euclid, which till they be demonstrate, they seem strange to our assent; but being demonstrate, our mind accepteth of them by a kind of relation (as the lawyers speak) as if we had known them before.

Another error, that hath also some affinity with the former, is a conceit that of former opinions or sects, after variety and examination, the best hath still prevailed and suppressed the rest; so as if a man should begin the labour of a new search, he were but like to light upon somewhat formerly rejected, and by rejection brought into oblivion: as if the multitude, or the wisest for the multitude's sake, were not ready to give passage rather to that which is popular and superficial than to that which is substantial and profound; for the truth is, that

time seemeth to be of the nature of a river or stream, which carrieth down to us that which is light and blown up, and sinketh and drowneth that which is weighty and solid.

Another error, of a diverse nature from all the former, is the over-early and peremptory reduction of knowledge into arts and methods; from which time commonly sciences receive small or no augmentation. But as young men, when they knit and shape perfectly, do seldom grow to a further stature; so knowledge, while it is in aphorisms and observations, it is in growth; but when it once is comprehended in exact methods, it may perchance be further polished and illustrate [1], and accommodated for use and practice; but it increaseth no more in bulk and substance.

Another error, which doth succeed that which we last mentioned, is that after the distribution of particular arts and sciences, men have abandoned universality, or *philosophia prima;* which cannot but cease and stop all progression. For no perfect discovery can be made upon a flat or a level: neither is it possible to discover the more remote and deeper parts of any science, if you stand but upon the level of the same science, and ascend not to a higher science.

Another error hath proceeded from too great a reverence, and a kind of adoration of the mind and understanding of man; by means whereof men have withdrawn themselves too much from the contemplation of nature and the observations of experience, and have tumbled up and down in their own reason and conceits. Upon these intellectualists, which are notwithstanding commonly taken for the most sublime and divine philosophers, Heraclitus gave a just censure, saying, *Men sought truth in their own little worlds, and not in the great and common world;* for they disdain to spell and so by degrees to read in the volume of God's works; and contrariwise by continual meditation and agitation of wit do urge and as it were invocate their own spirits to divine and give oracles unto them, whereby they are deservedly deluded.

Another error that hath some connexion with this later is, that men have used to infect their meditations, opinions, and doctrines, with some conceits which they have most admired, or some sciences which they have most applied; and given all things else a tincture according to them, utterly untrue and

[1] So the original. Ed. 1633 has *illustrated.*

unproper. So hath Plato intermingled his philosophy with theology, and Aristotle with logic, and the second school of Plato, Proclus and the rest, with the mathematics. For these were the arts which had a kind of primogeniture with them severally. So have the alchemists made a philosophy out of a few experiments of the furnace; and Gilbertus, our countryman, hath made a philosophy out of the observations of a loadstone. So Cicero, when, reciting the several opinions of the nature of the soul, he found a musician that held the soul was but a harmony, saith pleasantly, *Hic ab arte sua non recessit, &c.* [he was constant to his own art]. But of these conceits Aristotle speaketh seriously and wisely, when he saith, *Qui respiciunt ad pauca de facili pronunciant:* [they who take only few points into account find it easy to pronounce judgment].

Another error is an impatience of doubt, and haste to assertion without due and mature suspension of judgment. For the two ways of contemplation are not unlike the two ways of action commonly spoken of by the ancients; the one plain and smooth in the beginning, and in the end impassable; the other rough and troublesome in the entrance, but after a while fair and even. So it is in contemplation; if a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts, he shall end in certainties.

Another error is in the manner of the tradition and delivery of knowledge, which is for the most part magistral and peremptory, and not ingenuous and faithful; in a sort as may be soonest believed, and not easiliest examined. It is true that in compendious treatises for practice that form is not to be disallowed. But in the true handling of knowledge, men ought not to fall either on the one side into the vein of Velleius the Epicurean, *Nil tam metuens, quàm ne dubitare aliqua de re videretur,* [who feared nothing so much as the seeming to be in doubt about anything,] nor on the other side into Socrates his ironical doubting of all things; but to propound things sincerely, with more or less asseveration, as they stand in a man's own judgment proved more or less.

Other errors there are in the scope that men propound to themselves, whereunto they bend their endeavours; for whereas the more constant and devote[1] kind of professors of any science ought to propound to themselves to make some additions to

[1] So the original. Ed. 1633 has *devoute.*

their science, they convert their labours to aspire to certain second prizes; as to be a profound interpreter or commenter, to be a sharp champion or defender, to be a methodical compounder or abridger; and so the patrimony of knowledge cometh to be sometimes improved, but seldom augmented.

But the greatest error of all the rest is the mistaking or misplacing of the last or furthest end of knowledge. For men have entered into a desire of learning and knowledge, sometimes upon a natural curiosity and inquisitive appetite; sometimes to entertain their minds with variety and delight; sometimes for ornament and reputation; and sometimes to enable them to victory of wit and contradiction; and most times for lucre and profession; and seldom sincerely to give a true account of their gift of reason, to the benefit and use of men: as if there were sought in knowledge a couch, whereupon to rest a searching and restless spirit; or a terrace, for a wandering and variable mind to walk up and down with a fair prospect; or a tower of state, for a proud mind to raise itself upon; or a fort or commanding ground, for strife and contention; or a shop, for profit or sale; and not a rich storehouse, for the glory of the Creator and the relief of man's estate. But this is that which will indeed dignify and exalt knowledge, if contemplation and action may be more nearly and straitly conjoined and united together than they have been; a conjunction like unto that of the two highest planets, Saturn the planet of rest and contemplation, and Jupiter the planet of civil society and action. Howbeit, I do not mean, when I speak of use and action, that end before-mentioned of the applying of knowledge to lucre and profession: for I am not ignorant how much that diverteth and interrupteth the prosecution and advancement of knowledge; like unto the golden ball thrown before Atalanta, which while she goeth aside and stoopeth to take up, the race is hindered,

Declinat cursus, aurumque volubile tollit.

Neither is my meaning, as was spoken of Socrates, to call philosophy down from heaven to converse upon the earth; that is, to leave natural philosophy aside, and to apply knowledge only to manners and policy. But as both heaven and earth do conspire and contribute to the use and benefit of man, so the end ought to be, from both philosophies to separate and

reject vain speculations and whatsoever is empty and void, and to preserve and augment whatsoever is solid and fruitful; that knowledge may not be as a curtesan, for pleasure and vanity only, or as a bond-woman, to acquire and gain to her master's use; but as a spouse, for generation, fruit, and comfort.

Thus have I described and opened, as by a kind of dissection, those peccant humours (the principal of them) which have[1] not only given impediment to the proficience of learning, but have given also occasion to the traducement thereof: wherein if I have been too plain, it must be remembered *Fidelia vulnera amantis, sed dolosa oscula malignantis:* [faithful are the wounds of a friend, but the kisses of an enemy are deceitful]. This I think I have gained, that I ought to be the better believed in that which I shall say pertaining to commendation, because I have proceeded so freely in that which concerneth censure. And yet I have no purpose to enter into a laudative of learning, or to make a hymn to the muses, (though I am of opinion that it is long since their rites were duly celebrated:) but my intent is, without varnish or amplification, justly to weigh the dignity of knowledge in the balance with other things, and to take the true value thereof by testimonies and arguments divine and human.

First therefore, let us seek the dignity of knowledge in the arch-type or first platform, which is in the attributes and acts of God, as far as they are revealed to man and may be observed with sobriety; wherein we may not seek it by the name of learning; for all learning is knowledge acquired, and all knowledge in God is original: and therefore we must look for it by another name, that of wisdom or sapience, as the Scriptures call it.

It is so then, that in the work of the creation we see a double emanation of virtue from God; the one referring more properly to power, the other to wisdom; the one expressed in making the subsistence of the matter, and the other in disposing the beauty of the form. This being supposed, it is to be observed, that for any thing which appeareth in the history of the creation, the confused mass and matter of heaven and earth was made in a moment, and the order and disposition of that chaos or mass was the work of six days; such a note

[1] *hath* in all the old editions.

of difference it pleased God to put upon the works of power and the works of wisdom; wherewith concurreth, that in the former it is not set down that God said, *Let there be heaven and earth*, as it is set down of the works following; but actually, that God made heaven and earth: the one carrying the style of a manufacture, and the other of a law, decree, or counsel.

To proceed to that which is next in order, from God to spirits; we find, as far as credit is to be given to the celestial hierarchy of that supposed Dionysius the senator of Athens[1], the first place or degree is given to the angels of love, which are termed Seraphim; the second to the angels of light, which are termed Cherubim; and the third and so following places to thrones, principalities, and the rest, which are all angels of power and ministry; so as the angels of knowledge and illumination are placed before the angels of office and domination.

To descend from spirits and intellectual forms to sensible and material forms; we read the first form that was created was light, which hath a relation and correspondence in nature and corporal things, to knowledge in spirits and incorporal things.

So in the distribution of days, we see the day wherein God did rest and contemplate his own works, was blessed above all the days wherein he did effect and accomplish them.

After the creation was finished, it is set down unto us that man was placed in the garden to work therein; which work so appointed to him could be no other than work of contemplation; that is, when the end of work is but for exercise and experiment, not for necessity; for there being then no reluctation of the creature, nor sweat of the brow, man's employment must of consequence have been matter of delight in the experiment, and not matter of labour for the use. Again, the first acts which man performed in Paradise consisted of the two summary parts of knowledge; the view of creatures, and the imposition of names. As for the knowledge which induced the fall, it was, as was touched before, not the natural knowledge of creatures, but the moral knowledge of good and evil; wherein the supposition was, that God's commandments or prohibitions were not the originals of good and evil, but

[1] *quæ Dionysii Areopagitæ nomine evulgatur*, are the words of the translation: the insinuation implied in the word *supposed*, being withdrawn, or at least not so strongly expressed. See note p. 277.

that they had other beginnings, which man aspired to know, to the end to make a total defection from God, and to depend wholly upon himself.

To pass on: in the first event or occurrence after the fall of man, we see (as the Scriptures have infinite mysteries, not violating at all the truth of the story or letter,) an image of the two estates, the contemplative state and the active state, figured in the two persons of Abel and Cain, and in the two simplest and most primitive trades of life; that of the shepherd, (who, by reason of his leisure, rest in a place, and living in view of heaven, is a lively image of a contemplative life,) and that of the husbandman: where we see again the favour and election of God went to the shepherd, and not to the tiller of the ground.

So in the age before the flood, the holy records within those few memorials which are there entered and registered have vouchsafed to mention and honour the name of the inventors and authors of music and works in metal. In the age after the flood, the first great judgment of God upon the ambition of man was the confusion of tongues; whereby the open trade and intercourse of learning and knowledge was chiefly imbarred.

To descend to Moses the lawgiver, and God's first pen: he is adorned by the Scriptures with this addition and commendation, that he was *seen in all the learning of the Egyptians;* which nation we know was one of the most ancient schools of the world: for so Plato brings in the Egyptian priest saying unto Solon: *You Grecians are ever children; you have no knowledge of antiquity, nor antiquity of knowledge.* Take a view of the ceremonial law of Moses; you shall find, besides the prefiguration of Christ, the badge or difference of the people of God, the exercise and impression of obedience, and other divine uses and fruits thereof, that some of the most learned Rabbins have travelled profitably and profoundly to observe, some of them a natural, some of them a moral, sense or reduction of many of the ceremonies and ordinances. As in the law of the leprosy, where it is said, *If the whiteness have overspread the flesh, the patient may pass abroad for clean; but if there be any whole flesh remaining, he is to be shut up for unclean;* one of them noteth a principle of nature, that putrefaction is more contagious before maturity than after: and another noteth a position of moral philosophy, that men abandoned to vice do not

so much corrupt manners, as those that are half good and half evil. So in this and very many other places in that law, there is to be found, besides the theological sense, much aspersion of philosophy.

So likewise in that excellent book of Job, if it be revolved with diligence, it will be found pregnant and swelling with natural philosophy; as for example, cosmography and the roundness of the world; *Qui extendit aquilonem super vacuum, et appendit terram super nihilum;* [who stretcheth out the north upon the empty space, and hangeth the earth upon nothing;] wherein the pensileness of the earth, the pole of the north, and the finiteness or convexity of heaven are manifestly touched. So again matter of astronomy; *Spiritus ejus ornavit cœlos, et obstetricante manu ejus eductus est Coluber tortuosus:* [by his spirit he hath garnished the heavens; his hand hath formed the crooked Serpent]. And in another place; *Nunquid conjungere valebis micantes stellas Pleiadas, aut gyrum Arcturi poteris dissipare?* [canst thou bring together the glittering stars of the Pleiades, or scatter the array of Arcturus?] where the fixing of the stars, ever standing at equal distance, is with great elegancy noted. And in another place, *Qui facit Arcturum, et Oriona, et Hyadas, et interiora Austri;* [which maketh Arcturus, Orion, and Hyades, and the secrets of the South;] where again he takes knowledge of the depression of the southern pole, calling it the secrets of the south, because the southern stars were in that climate unseen. Matter of generation; *Annon sicut lac mulsisti me, et sicut caseum coagulasti me?* &c. [hast thou not drawn me forth like milk, and curdled me like cheese?] Matter of minerals; *Habet argentum venarum suarum principia: et auro locus est in quo conflatur, ferrum de terra tollitur, et lapis solutus calore in æs vertitur:* [surely there is a vein for the silver, and a place for gold where they fine it. Iron is taken out of the earth, and brass is molten out of the stone:] and so forwards in that chapter.

So likewise in the person of Salomon the king, we see the gift or endowment of wisdom and learning, both in Salomon's petition and in God's assent thereunto, preferred before all other terrene and temporal felicity. By virtue of which grant or donative of God, Salomon became enabled not only to write those excellent parables or aphorisms concerning divine and moral philosophy, but also to compile a natural history of all

verdure [1], from the cedar upon the mountain to the moss upon the wall, (which is but a rudiment between putrefaction and an herb,) and also of all things that breathe or move. Nay, the same Salomon the king, although he excelled in the glory of treasure and magnificent buildings, of shipping and navigation, of service and attendance, of fame and renown, and the like, yet he maketh no claim to any of those glories, but only to the glory of inquisition of truth; for so he saith expressly, *The glory of God is to conceal a thing, but the glory of the king is to find it out;* as if, according to the innocent play of children, the Divine Majesty took delight to hide his works, to the end to have them found out; and as if kings could not obtain a greater honour than to be God's playfellows in that game, considering the great commandment of wits and means, whereby nothing needeth to be hidden from them.

Neither did the dispensation of God vary in the times after our Saviour came into the world; for our Saviour himself did first shew his power to subdue ignorance, by his conference with the priests and doctors of the law, before he shewed his power to subdue nature by his miracles. And the coming of the Holy Spirit was chiefly figured and expressed in the similitude and gift of tongues, which are but *vehicula scientiæ*, [carriers of knowledge].

So in the election of those instruments which it pleased God to use for the plantation of the faith, notwithstanding that at the first he did employ persons altogether unlearned otherwise than by inspiration, more evidently to declare his immediate working, and to abase all human wisdom or knowledge; yet nevertheless that counsel of his was no sooner performed, but in the next vicissitude and succession he did send his divine truth into the world waited on with other learnings as with servants or handmaids: for so we see St. Paul, who was only learned amongst the apostles, had his pen most used in the scriptures of the New Testament.

So again we find that many of the ancient bishops and fathers of the Church were excellently read and studied in all the learning of the heathen; insomuch that the edict of the emperor Julianus, (whereby it was interdicted unto Christians to be admitted into schools, lectures, or exercises of learning,)

[1] *verdor* in edd. 1605, 1629, 1633; which perhaps ought to be retained, as another form of the word rather than another way of spelling it.

was esteemed and accounted a more pernicious engine and machination against the Christian faith, than were all the sanguinary prosecutions of his predecessors; neither could the emulation and jealousy of Gregory the first of that name, bishop of Rome, ever obtain the opinion of piety or devotion; but contrariwise received the censure of humour, malignity, and pusillanimity[1], even amongst holy men; in that he designed to obliterate and extinguish the memory of heathen antiquity and authors. But contrariwise it was the Christian Church, which amidst the inundations of the Scythians on the one side from the north-west, and the Saracens from the east, did preserve in the sacred lap and bosom thereof the precious relics even of heathen learning, which otherwise had been extinguished as if no such thing had ever been.

And we see before our eyes, that in the age of ourselves and our fathers, when it pleased God to call the church of Rome to account for their degenerate manners and ceremonies, and sundry doctrines obnoxious and framed to uphold the same abuses; at one and the same time it was ordained by the Divine Providence that there should attend withal a renovation and new spring of all other knowledges[2]: and on the other side we see the Jesuits, who partly in themselves and partly by the emulation and provocation of their example, have much quickened and strengthened the state of learning,—we see (I say) what notable service and reparation they have done to the Roman see.

Wherefore to conclude this part, let it be observed that there be two principal duties and services, besides ornament and illustration, which philosophy and human learning do perform to faith and religion. The one, because they are an effectual inducement to the exaltation of the glory of God: For as the Psalms and other Scriptures do often invite us to consider and magnify the great and wonderful works of God, so if we should rest only in the contemplation of the exterior of them as they first offer themselves to our senses, we should do a like injury unto the majesty of God as if we should judge or construe of the store of some excellent jeweller by that only which is set out toward the street in his shop. The other,

[1] This clause is omitted in the translation; and the words *cætera viri egregii* are introduced after the name of Gregory. See note p. 277.

[2] All this, from the beginning of the paragraph, is omitted in the translation See note p. 277.

because they minister a singular help and preservative against unbelief and error: For our Saviour saith, *You err, not knowing the Scriptures, nor the power of God;* laying before us two books or volumes to study, if we will be secured from error; first the Scriptures, revealing the will of God, and then the creatures expressing his power; whereof the later is a key unto the former; not only opening our understanding to conceive the true sense of the Scriptures, by the general notions of reason and rules of speech; but chiefly opening our belief, in drawing us into a due meditation of the omnipotency of God, which is chiefly signed and engraven upon his works. Thus much therefore for divine testimony and evidence concerning the true dignity and value of learning.

As for human proofs, it is so large a field, as in a discourse of this nature and brevity it is fit rather to use choice of those things which we shall produce, than to embrace the variety of them. First therefore, in the degrees of human honour amongst the heathen it was the highest, to obtain to a veneration and adoration as a God. This unto the Christians is as the forbidden fruit. But we speak now separately of human testimony: according to which that which the Grecians call *apotheosis*, and the Latins *relatio inter divos*, was the supreme honour which man could attribute unto man; specially when it was given, not by a formal decree or act of state, as it was used among the Roman emperors, but by an inward assent and belief; which honour being so high, had also a degree or middle term; for there were reckoned above human honours, honours[1] heroical and divine; in the attribution and distribution of which honours we see antiquity made this difference: that whereas founders and uniters of states and cities, lawgivers, extirpers of tyrants, fathers of the people, and other eminent persons in civil merit, were honoured but with the titles of worthies or demi-gods; such as were Hercules, Theseus, Minos, Romulus, and the like; on the other side, such as were inventors and authors of new arts, endowments, and commodities towards man's life, were ever consecrated amongst the gods themselves; as was Ceres, Bacchus, Mercurius, Apollo, and others; and justly; for the merit of the former is confined within the circle of an age or a nation; and is like fruitful showers, which though they be profitable and good, yet serve but for that season, and for a

[1] *honour* in edd. 1605, 1629, 1633.

latitude of ground where they fall; but the other is indeed like the benefits of heaven, which are permanent and universal. The former again is mixed with strife and perturbation; but the later hath the true character of divine presence, coming[1] in *aura leni*, without noise or agitation.

Neither is certainly that other merit of learning, in repressing the inconveniencies which grow from man to man, much inferior to the former, of relieving the necessities which arise from nature; which merit was lively set forth by the ancients in that feigned relation of Orpheus theatre; where all beasts and birds assembled, and forgetting their several appetites, some of prey, some of game, some of quarrel, stood all sociably together listening unto the airs and accords of the harp; the sound whereof no sooner ceased, or was drowned by some louder noise, but every beast returned to his own nature: wherein is aptly described the nature and condition of men; who are full of savage and unreclaimed desires, of profit, of lust, of revenge, which as long as they give ear to precepts, to laws, to religion, sweetly touched with eloquence and persuasion of books, of sermons, of harangues, so long is society and peace maintained; but if these instruments be silent, or that sedition and tumult make them not audible, all things dissolve into anarchy and confusion.

But this appeareth more manifestly, when kings themselves, or persons of authority under them, or other governors in commonwealths and popular estates, are endued with learning. For although he might be thought partial to his own profession, that said *Then should people and estates be happy, when either kings were philosophers, or philosophers kings;* yet so much is verified by experience, that under learned princes and governors there have been ever the best times: for howsoever kings may have their imperfections in their passions and customs, yet if they be illuminate by learning, they have those notions of religion, policy, and morality, which do preserve them and refrain them from all ruinous and peremptory errors and excesses; whispering evermore in their ears, when counsellors and servants stand mute and silent. And senators or counsellors likewise which be learned, do proceed upon more safe and substantial principles than counsellors which are only men of experience; the

[1] *commonly* in edd. 1629 and 1633. In the original, *com-* ends a line and the rest of the word has accidentally dropped out.

one sort keeping dangers afar off, whereas the other discover them not till they come near hand, and then trust to the agility of their wit to ward or avoid them.

Which felicity of times under learned princes (to keep still the law of brevity, by using the most eminent and selected examples) doth best appear in the age which passed from the death of Domitianus the emperor until the reign of Commodus; comprehending a succession of six princes[1], all learned or singular favourers and advancers of learning; which age, for temporal respects, was the most happy and flourishing that ever the Roman empire (which then was a model of the world) enjoyed: a matter revealed and prefigured unto Domitian in a dream the night before he was slain; for he thought there was grown behind upon his shoulders a neck and a head of gold, which came accordingly to pass in those golden times which succeeded: of which princes we will make some commemoration; wherein although the matter will be vulgar, and may be thought fitter for a declamation than agreeable to a treatise infolded as this is, yet because it is pertinent to the point in hand, *neque semper arcum tendit Apollo,* [and Apollo does not keep his bow always bent,] and to name them only were too naked and cursory, I will not omit it altogether.[2]

The first was Nerva; the excellent temper of whose government is by a glance in Cornelius Tacitus touched to the life: *Postquam divus Nerva res olim insociabiles miscuisset, imperium et libertatem:* [he united and reconciled two things which used not to go together—government and liberty].[3] And in token of his learning, the last act of his short reign left to memory was a missive to his adopted son Trajan, proceeding upon some inward discontent at the ingratitude of the times, comprehended in a verse of Homer's;

Telis, Phœbe, tuis lacrymas ulciscere nostras.
[O Phœbus, with thy shafts avenge these tears.]

[1] So edd. 1629 and 1633. The original has *sciences.*

[2] In the *De Augmentis* he merely says "*de quibus,*" *i. e.* the golden times, "*sigillatim sed brevissime verba faciam.*" And the next five paragraphs are condensed into one.

[3] Agric. 3.: *Quanquam . . . . Nerva Cæsar res olim dissociabiles miscuerit, principatum ac libertatem.* This quotation is omitted in the translation, where nothing is said of the character of Nerva's government except that he was *clementissimus imperator, quique, si nihil aliud, orbi Trajanum dedit;* from which it would almost seem that Bacon thought it hardly deserved the praise which Tacitus bestows upon it. In evidence of his *learning* he adds that he was the friend, and as it were the disciple, of Apollonius the Pythagorean.

Trajan, who succeeded, was for his person not learned: but if we will hearken to the speech of our Saviour, that saith, *He that receiveth a prophet in the name of a prophet, shall have at prophet's reward,* he deserveth to be placed amongst the most learned princes: for there was not a greater admirer of learning or benefactor of learning; a founder of famous libraries, a perpetual advancer of learned men to office, and a familiar converser with learned professors and preceptors, who were noted to have then most credit in court. On the other side, how much Trajan's virtue and government was admired and renowned, surely no testimony of grave and faithful history doth more lively set forth, than that legend tale of Gregorius Magnus, bishop of Rome, who was noted for the extreme envy he bare towards all heathen excellency: and yet he is reported, out of the love and estimation of Trajan's moral virtues, to have made unto God passionate and fervent prayers for the delivery of his soul out of hell; and to have obtained it, with a caveat that he should make no more such petitions.[1] In this prince's time also the persecutions against the Christians received intermission, upon the certificate of Plinius Secundus, a man of excellent learning and by Trajan advanced.

Adrian, his successor, was the most curious man that lived, and the most universal inquirer; insomuch as it was noted for an error in his mind, that he desired to comprehend all things, and not to reserve himself for the worthiest things; falling into the like humour that was long before noted in Philip of Macedon, who when he would needs over-rule and put down an excellent musician in an argument touching music, was well answered by him again, *God forbid, Sir,* (saith he,) *that your fortune should be so bad, as to know these things better than I.*[2]

[1] To this story Dante alludes in the tenth canto of *Purgatory;* taking it apparently from the life of Gregory by Paul the Deacon. It seems first to have been mentioned by John Damascene in his discourse "De iis qui in fide dormierunt;" from whom St. Thomas Aquinas quotes it in his *Supplementary Questions,* 71. 5. The hymn sung in the fourteenth century in the Cathedral of Mantua on St. Paul's day, is another curious instance of the appreciation of Heathen worth in the middle ages. It is there said of St. Paul,

Ad Maronis mausoleum
Ductus fudit super eum
Piæ rorem lacrymæ;
Quem te, inquit, reddidissem
Si te vivum invenissem
Poetarum maxime!

See Schœll's *Histoire de la Littérature Romaine.* — *R. L. E.* This whole passage is omitted in the translation.

[2] Plutarch, Apoph.

It pleased God likewise to use the curiosity of this emperor as an inducement to the peace of his church in those days. For having Christ in veneration, not as a God or Saviour, but as a wonder or novelty, and having his picture in his gallery matched with Appollonius (with whom in his vain imagination he thought he had some conformity), yet it served the turn to allay the bitter hatred of those times against the Christian name; so as the church had peace during his time.[1] And for his government civil, although he did not attain to that of Trajan's[2] in glory of arms or perfection of justice, yet in deserving of the weal of the subject he did exceed him. For Trajan erected many famous monuments and buildings; insomuch as Constantine the Great in emulation was wont to call him *Parietaria*, wall flower, because his name was upon so many walls: but his buildings and works were more of glory and triumph than use and necessity. But Adrian spent his whole reign, which was peaceable, in a perambulation or survey of the Roman empire; giving order and making assignation where he went for re-edifying of cities, towns, and forts decayed, and for cutting of rivers and streams, and for making bridges and passages, and for policing[3] of cities and commonalties with new ordinances and constitutions, and granting new franchises and incorporations; so that his whole time was a very restoration of all the lapses and decays of former times.

Antoninus[4] Pius, who succeeded him, was a prince excellently learned; and had the patient and subtile wit of a schoolman; insomuch as in common speech (which leaves no virtue untaxed) he was called *cymini sector*, a carver or divider of cummin seed, which is one of the least seeds; such a patience he had and settled spirit to enter into the least and most exact differences of causes; a fruit no doubt of the exceeding tranquillity and serenity of his mind; which being no ways charged or incumbered either with fears, remorses, or scruples, but having been noted for a man of the purest goodness, without all fiction or affectation, that hath reigned or

[1] There seems here a confusion of two stories. It was Alexander Severus who according to Lampridius had a picture of our Saviour "matched with Apollonius" and with some others. Hadrian however did honour Apollonius and is said to have thought of dedicating a temple to Christ, which, if I remember rightly, Alexander actually did. — *R. L. E.*

[2] So in all three editions. Qy. Trajan?

[3] *pollicing*, edd. 1605 and 1629. *pollishing*, ed. 1633.

[4] *Antonius*, edd. 1605, 1629, 1633.

lived, made his mind continually present and entire. He likewise approached a degree nearer unto Christianity, and became, as Agrippa said unto St. Paul, *half a Christian;* holding their religion and law in good opinion, and not only ceasing persecution, but giving way to the advancement of Christians.

There succeeded him the first *Divi fratres*, the two adoptive brethren, Lucius Commodus Verus, son to Ælius Verus, who delighted much in the softer kind of learning, and was wont to call the poet Martial his Virgil; and Marcus Aurelius Antoninus; whereof the later, who obscured his colleague[1] and survived him long, was named the Philosopher: who as he excelled all the rest in learning, so he excelled them likewise in perfection of all royal virtues; insomuch as Julianus the emperor, in his book intitled *Cæsares*, being as a pasquil or satire to deride all his predecessors, feigned that they were all invited to a banquet of the gods, and Silenus the jester sat at the nether end of the table and bestowed a scoff on every one as they came in; but when Marcus Philosophus came in, Silenus was gravelled and out of countenance, not knowing where to carp at him; save at the last he gave a glance at his patience towards his wife. And the virtue of this prince, continued with that of his predecessor, made the name of Antoninus so sacred in the world, that though it were extremely dishonoured in Commodus, Caracalla, and Heliogabalus, who all bare the name, yet when Alexander Severus refused the name because he was a stranger to the family, the Senate with one acclamation said, *Quomodo Augustus, sic et Antoninus:* [let the name of Antoninus be as the name of Augustus:] in such renown and veneration was the name of these two princes in those days, that they would have it as a perpetual addition in all the emperors' style. In this emperor's time also the church for the most part was in peace; so as in this sequence of six princes we do see the blessed effects of learning in sovereignty, painted forth in the greatest table of the world.

But for a tablet or picture of smaller volume, (not presuming to speak of your Majesty that liveth,) in my judgment the most excellent is that of queen Elizabeth, your immediate predecessor in this part of Britain; a prince that, if Plutarch were

[1] In the translation he says that Lucius though not so good as his brother was better than most of the other emperors. (*Fratri quidem bonitate cedens, reliquos imperatores plurimos superans.*)

now alive to write lives[1] by parallels, would trouble him, I think, to find for her a parallel amongst women. This lady was endued with learning in her sex singular, and rare[2] even amongst masculine princes; whether we speak of learning of[3] language or of science; modern or ancient; divinity or humanity. And unto the very last year of her life she accustomed to appoint set hours for reading, scarcely any young student in an university more daily or more duly. As for her[4] government, I assure myself I shall not exceed if I do affirm that this part of the island never had forty-five years of better times; and yet not through the calmness of the season, but through the wisdom of her regiment. For if there be considered of the one side, the truth of religion established; the constant peace and security; the good administration of justice; the temperate use of the prerogative, not slackened, nor much strained; the flourishing state of learning, sortable to so excellent a patroness; the convenient estate of wealth and means, both of crown and subject; the habit of obedience, and the moderation of discontents; and there be considered on the other side, the differences of religion, the troubles of neighbour countries, the ambition of Spain, and opposition of Rome; and then that she was solitary and of herself: these things I say considered, as I could not have chosen an instance so recent and so proper, so I suppose I could not have chosen one more remarkable or eminent, to the purpose now in hand; which is concerning the conjunction of learning in the prince with felicity in the people.[5]

Neither hath learning an influence and operation only upon civil merit and moral virtue, and the arts or temperature of peace and peaceable government; but likewise it hath no less power and efficacy in enablement towards martial and military virtue and prowess; as may be notably represented in the examples of Alexander the Great and Cæsar the Dictator, mentioned before, but now in fit place to be resumed; of whose virtues and acts in war there needs no note or recital,

[1] *lynes*, ed. 1605 and 1629. *lines* ed. 1633.

[2] So edd. 1629 and 1633. Ed. 1605 has *grace*.

[3] Edd. 1629 and 1633 have *or;* with a semicolon after *learning*, where the original has a comma; the omission of which makes the meaning and construction clear.

[4] So edd. 1629 and 1633. The original has *the*.

[5] This paragraph is entirely omitted in the *De Augmentis;* no doubt as one which would not be allowed at Rome and might lead to the proscription of the book. See note p. 277.

having been the wonders of time in that kind; but of their affections towards learning, and perfections in learning, it is pertinent to say somewhat.

Alexander was bred and taught under Aristotle the great philosopher, who dedicated divers of his books of philosophy unto him. He was attended with Callisthenes and divers other learned persons, that followed him in camp, throughout his journeys and conquests. What price and estimation he had learning in doth notably appear in these three particulars: first, in the envy he used to express that he bare towards Achilles, in this that he had so good a trumpet of his praises as Homer's verses; secondly, in the judgment or solution he gave touching that precious cabinet of Darius, which was found among his jewels, whereof question was made what thing was worthy to be put into it, and he gave his opinion for Homer's works; thirdly, in his letter to Aristotle, after he had set forth his books of nature, wherein he expostulateth with him for publishing the secrets or mysteries of philosophy, and gave him to understand that himself esteemed it more to excel other men in learning and knowledge than in power and empire. And what use he had of learning doth appear, or rather shine, in all his speeches and answers, being full of science and use of science, and that in all variety.

And herein again it may seem a thing scholastical, and somewhat idle, to recite things that every man knoweth; but yet since the argument I handle leadeth me thereunto, I am glad that men shall perceive I am as willing to flatter (if they will so call it) an Alexander or a Cæsar or an Antoninus, that are dead many hundred years since, as any that now liveth: for it is the displaying of the glory of learning in sovereignty that I propound to myself, and not an humour of declaiming in any man's praises.[1] Observe then the speech he used of Diogenes, and see if it tend not to the true state of one of the greatest questions of moral philosophy; whether the enjoying of outward things or the contemning of them be the greatest happiness; for when he saw Diogenes so perfectly contented with so little, he said to those that mocked at his condition, *Were I not Alexander, I would wish to be Diogenes.* But Seneca inverteth it, and saith, *Plus erat quod hic nollet accipere, quàm quod ille posset dare.* There were more things which Diogenes

[1] All this from the beginning of the paragraph is omitted in the translation.

would have refused, than those were which Alexander could have given or enjoyed.

Observe again that speech which was usual with him, *That he felt his mortality chiefly in two things, sleep and lust;* and see if it were not a speech extracted out of the depth of natural philosophy, and liker to have comen out of the mouth of Aristotle or Democritus than from Alexander.[1]

See again that speech of humanity and poesy; when upon the bleeding of his wounds, he called unto him one of his flatterers that was wont to ascribe to him divine honour, and said, *Look, this is very blood; this is not such a liquor as Homer speaketh of, which ran from Venus' hand when it was pierced by Diomedes.*

See likewise his readiness in reprehension of logic, in the speech he used to Cassander upon a complaint that was made against his father Antipater: for when Alexander happed to say, *Do you think these men would have come from so far to complain, except they had just cause of grief?* and Cassander answered, *Yea, that was the matter, because they thought they should not be disproved;* said Alexander laughing, *See the subtilties of Aristotle, to take a matter both ways,* pro et contra, &c.

But note again how well he could use the same art which he reprehended, to serve his own humour, when bearing a secret grudge to Callisthenes because he was against the new ceremony of his adoration, feasting one night where the same Callisthenes was at the table, it was moved by some after supper, for entertainment sake, that Callisthenes who was an eloquent man might speak of some theme or purpose at his own choice; which Callisthenes did; choosing the praise of the Macedonian nation for his discourse, and performing the same with so good manner as the hearers were much ravished; whereupon Alexander, nothing pleased, said, *It was easy to be eloquent upon so good a subject:* but saith he, *Turn your style, and let us hear what you can say against us:* which Callisthenes presently undertook, and did with that sting and life, that Alexander interrupted him, and said, *The goodness of the cause made him eloquent before, and despite made him eloquent then again.*

[1] *cum tam indigentia tam redundantia naturæ, per illa duo designata, mortis sin. tanquam arrhabones;* the two opposite imperfections of nature, deficiency and superfluity, exhaustion and incontinence, being as it were earnests of mortality.

Consider further, for tropes of rhetoric, that excellent use of a metaphor or translation, wherewith he taxed Antipater, who was an imperious and tyrannous governor: for when one of Antipater's friends commended him to Alexander for his moderation, that he did not degenerate, as his other lieutenants did, into the Persian pride, in use of purple, but kept the ancient habit of Macedon, of black; *True*, (saith Alexander,) *but Antipater is all purple within.* Or that other, when Parmenio came to him in the plain of Arbella, and shewed him the innumerable multitude of his enemies, specially as they appeared by the infinite number of lights, as it had been a new firmament of stars, and thereupon advised him to assail them by night: whereupon he answered, *That he would not steal the victory.*

For matter of policy, weigh that significant distinction, so much in all ages embraced, that he made between his two friends Hephæstion and Craterus, when he said, *That the one loved Alexander, and the other loved the king;* describing the principal difference of princes' best servants, that some in affection love their person, and others in duty love their crown.

Weigh also that excellent taxation of an error ordinary with counsellors of princes, that they counsel their masters according to the model of their own mind and fortune, and not of their masters; when upon Darius' great offers Parmenio had said, *Surely I would accept these offers, were I as Alexander;* saith Alexander, *So would I, were I as Parmenio.*

Lastly, weigh that quick and acute reply which he made when he gave so large gifts to his friends and servants, and was asked what he did reserve for himself, and he answered, *Hope;* weigh, I say, whether he had not cast up his account aright, because *hope* must be the portion of all that resolve upon great enterprises. For this was Cæsar's portion when he went first into Gaul, his estate being then utterly overthrown with largesses. And this was likewise the portion of that noble prince, howsoever transported with ambition, Henry duke of Guise, of whom it was usually said, that he was the greatest usurer in France, because he had turned all his estate into obligations.

To conclude therefore: as certain critics are used to say hyperbolically, *That if all sciences were lost, they might be found in Virgil;* so certainly this may be said truly, there are the prints and footsteps of learning in those few speeches which are

reported of this prince: the admiration of whom, when I consider him not as Alexander the Great, but as Aristotle's scholar, hath carried me too far.

As for Julius Cæsar, the excellency of his learning needeth not to be argued from his education, or his company, or his speeches; but in a further degree doth declare itself in his writings and works; whereof some are extant and permanent, and some unfortunately perished. For first, we see there is left unto us that excellent history of his own wars, which he intitled only a Commentary, wherein all succeeding times have admired the solid weight of matter, and the real passages and lively images of actions and persons, expressed in the greatest propriety of words and perspicuity of narration that ever was; which that it was not the effect of a natural gift, but of learning and precept, is well witnessed by that work of his intitled *De Analogia*, being a grammatical philosophy, wherein he did labour to make this same *vox ad placitum* to become *vox ad licitum*, and to reduce custom of speech to congruity of speech; and took as it were the picture of words from the life of reason.[1]

So we receive from him, as a monument both of his power and learning, the then reformed computation of the year; well expressing, that he took it to be as great a glory to himself to observe and know the law of the heavens as to give law to men upon the earth.

So likewise in that book of his *Anti-Cato*, it may easily appear that he did aspire as well to victory of wit as victory of war; undertaking therein a conflict against the greatest champion with the pen that then lived, Cicero the orator.

So again in his book of *Apophthegms* which he collected, we see that he esteemed it more honour to make himself but a pair of tables to take the wise and pithy words of others, than to have every word of his own to be made an apophthegm or an oracle; as vain princes, by custom of flattery, pretend to do. And yet if I should enumerate divers of his speeches, as I did those of Alexander, they are truly such as Salomon noteth, when he saith, *Verba sapientum tanquam aculei, et tanquam clavi*

[1] This passage is translated without addition or alteration. But Bacon seems to have changed his opinion afterwards upon the point in question. For in the sixth book of the *De Augmentis*, c. i., he intimates a suspicion that Cæsar's book was not a grammatical philosophy, but only a set of precepts for the formation of a pure, perfect, and unaffected style. See Vol. I. p. 654.

in altum defixi: [the words of the wise are as goads, and as nails fixed deep in:] whereof I will only recite three, not so delectable for elegancy, but admirable for vigour and efficacy.

As first, it is reason he be thought a master of words, that could with one word appease a mutiny in his army; which was thus. The Romans, when their generals did speak to their army, did use the word *Milites;* but when the magistrates spake to the people, they did use the word *Quirites.* The soldiers were in tumult, and seditiously prayed to be cashiered; not that they so meant, but by expostulation thereof to draw Cæsar to other conditions; wherein he being resolute not to give way, after some silence, he began his speech, *Ego, Quirites;* which did admit them already cashiered; wherewith they were so surprised, crossed, and confused, as they would not suffer him to go on in his speech, but relinquished their demands, and made it their suit to be again called by the name of *Milites.*

The second speech was thus: Cæsar did extremely affect the name of king; and some were set on, as he passed by, in popular acclamation to salute him king; whereupon, finding the cry weak and poor, he put it off thus in a kind of jest, as if they had mistaken his surname; *Non Rex sum, sed Cæsar:* [I am not King, but Cæsar:] a speech, that if it be searched, the life and fulness of it can scarce be expressed: for first it was a refusal of the name, but yet not serious: again it did signify an infinite confidence and magnanimity, as if he presumed Cæsar was the greater title; as by his worthiness it is come to pass till this day: but chiefly it was a speech of great allurement towards his own purpose; as if the state did strive with him but for a name, whereof mean families were vested; for Rex was a surname with the Romans, as well as King is with us.

The last speech which I will mention, was used to Metellus; when Cæsar, after war declared, did possess himself of the city of Rome; at which time entering into the inner treasury to take the money there accumulate, Metellus being tribune forbade him: whereto Cæsar said, *That if he did not desist, he would lay him dead in the place;* and presently taking himself up, he added, *Young man, it is harder for me to speak it than to do it. Adolescens, durius est mihi hoc dicere quàm facere.* A speech compounded of the greatest terror and greatest clemency that could proceed out of the mouth of man.

But to return and conclude with him: it is evident himself knew well his own perfection in learning, and took it upon him; as appeared when upon occasion that some spake what a strange resolution it was in Lucius Sylla to resign his dictature, he scoffing at him, to his own advantage, answered, *That Sylla could not skill of letters, and therefore knew not how to dictate.*

And here it were fit to leave this point touching the concurrence of military virtue and learning; (for what example would come with any grace after those two of Alexander and Cæsar?) were it not in regard of the rareness of circumstance that I find in one other particular, as that which did so suddenly pass from extreme scorn to extreme wonder; and it is of Xenophon the philosopher, who went from Socrates' school into Asia, in the expedition of Cyrus the younger against king Artaxerxes. This Xenophon at that time was very young, and never had seen the wars before; neither had any command in the army, but only followed the war as a voluntary, for the love and conversation of Proxenus his friend. He was present when Falinus came in message from the great king to the Grecians, after that Cyrus was slain in the field, and they a handful of men left to themselves in the midst of the king's territories, cut off from their country by many navigable rivers, and many hundred miles. The message imported that they should deliver up their arms, and submit themselves to the king's mercy. To which message before answer was made, divers of the army conferred familiarly with Falinus; and amongst the rest Xenophon happened to say, *Why Falinus, we have now but these two things left, our arms and our virtue; and if we yield up our arms, how shall we make use of our virtue?* Whereto Falinus smiling on him, said, *If I be not deceived, young gentleman, you are an Athenian; and I believe you study philosophy, and it is pretty that you say; but you are much abused if you think your virtue can withstand the king's power.* Here was the scorn; the wonder followed: which was, that this young scholar or philosopher, after all the captains were murdered in parley by treason, conducted those ten thousand foot through the heart of all the king's high countries from Babylon to Græcia in safety, in despite of all the king's forces, to the astonishment of the world, and the encouragement of the Grecians in time succeeding to make invasion upon the

kings of Persia; as was after purposed by Jason the Thessalian, attempted by Agesilaus the Spartan, and achieved by Alexander the Macedonian; all upon the ground of the act of that young scholar.

To proceed now from imperial and military virtue to moral and private virtue: first, it is an assured truth which is contained in the verses,

Scilicet ingenuas didicisse fideliter artes
Emollit mores, nec sinit esse feros;

[a true proficiency in liberal learning softens and humanises the manners]. It taketh away the wildness and barbarism and fierceness of men's minds: but indeed the accent had need be upon *fideliter:* [it must be a *true* proficiency:] for a little superficial learning[1] doth rather work a contrary effect. It taketh away all levity, temerity, and insolency, by copious suggestion of all doubts and difficulties, and acquainting the mind to balance reasons on both sides, and to turn back the first offers and conceits of the mind, and to accept of nothing but examined and tried. It taketh away vain admiration of any thing, which is the root of all weakness. For all things are admired, either because they are new, or because they are great. For novelty, no man that wadeth in learning or contemplation throughly, but will find that printed in his heart *Nil novi super terram:* [there is nothing new under the sun]. Neither can any man marvel at the play of puppets, that goeth behind the curtain and adviseth well of the motion. And for magnitude, as Alexander the Great after that he was used to great armies and the great conquests of the spacious provinces in Asia, when he received letters out of Greece of some fights and services there, which were commonly for a passage or a fort or some walled town at the most, he said, *It seemed to him that he was advertised of the battles of the frogs and the mice, that the old tales went of:* so certainly if a man meditate much upon the universal frame of nature, the earth with men upon it (the divineness of souls except) will not seem much other than an ant-hill, whereas some ants carry corn, and some carry their young, and some go empty, and all to and fro a little heap of dust. It taketh away or mitigateth fear of death or adverse fortune; which is one of

[1] *tumultuaria cognitio.*

the greatest impediments of virtue and imperfections of manners. For if a man's mind be deeply seasoned with the consideration of the mortality and corruptible nature of things, he will easily concur with Epictetus, who went forth one day and saw a woman weeping for her pitcher of earth that was broken, and went forth the next day and saw a woman weeping for her son that was dead; and thereupon said, *Heri vidi fragilem frangi, hodie vidi mortalem mori:* [yesterday I saw a brittle thing broken, to-day a mortal dead]. And therefore Virgil did excellently and profoundly couple the knowledge of causes and the conquest of all fears together, as *concomitantia.*

> Felix qui potuit rerum cognoscere causas,
> Quique metus omnes et inexorabile fatum
> Subjecit pedibus, strepitumque Acherontis avari.
>
> [Happy the man who doth the causes know
> Of all that is: serene he stands, above
> All fears; above the inexorable Fate,
> And that insatiate gulph that roars below.]

It were too long to go over the particular remedies which learning doth minister to all the diseases of the mind; sometimes purging the ill humours, sometimes opening the obstructions, sometimes helping digestion, sometimes increasing appetite, sometimes healing the wounds and exulcerations thereof, and the like; and therefore I will conclude with that which hath *rationem totius;* which is, that it disposeth the constitution of the mind not to be fixed or settled in the defects thereof, but still to be capable and susceptible of growth and reformation. For the unlearned man knows not what it is to descend into himself or to call himself to account, nor the pleasure of that *suavissima vita, indies sentire se fieri meliorem,* [to feel himself each day a better man than he was the day before]. The good parts he hath he will learn to shew to the full and use them dexterously, but not much to increase them: the faults he hath he will learn how to hide and colour them, but not much to amend them; like an ill mower, that mows on still and never whets his scythe: whereas with the learned man it fares otherwise, that he doth ever intermix the correction and amendment of his mind with the use and employment thereof. Nay further, in general and in sum, certain it is that *veritas* and *bonitas* differ but as the seal and the print; for

truth prints goodness, and they be the clouds of error which descend in the storms of passions and perturbations.

From moral virtue let us pass on to matter of power and commandment, and consider whether in right reason there be any comparable with that wherewith knowledge investeth and crowneth man's nature. We see the dignity of the commandment is according to the dignity of the commanded: to have commandment over beasts, as herdsmen have, is a thing contemptible; to have commandment over children, as schoolmasters have, is a matter of small honour; to have commandment over galley-slaves is a disparagement rather than an honour. Neither is the commandment of tyrants much better, over people which have put off the generosity of their minds: and therefore it was ever holden that honours in free monarchies and commonwealths had a sweetness more than in tyrannies; because the commandment extendeth more over the wills of men, and not only over their deeds and services. And therefore when Virgil putteth himself forth to attribute to Augustus Cæsar the best of human honours, he doth it in these words:

victorque volentes
Per populos dat jura, viamque affectat Olympo:

[Moving in conquest onward, at his will
To willing peoples he gives laws, and shapes
Through worthiest deeds on earth his course to Heaven.]

But yet the commandment of knowledge is yet higher than the commandment over the will; for it is a commandment over the reason, belief, and understanding of man, which is the highest part of the mind, and giveth law to the will itself. For there is no power on earth which setteth up a throne or chair of estate in the spirits and souls of men, and in their cogitations, imaginations, opinions, and beliefs, but knowledge and learning. And therefore we see the detestable and extreme pleasure that arch-heretics and false prophets and impostors are transported with, when they once find in themselves that they have a superiority in the faith and conscience of men; so great, that if they have once tasted of it, it is seldom seen that any torture or persecution can make them relinquish or abandon it. But as this is that which the author of the Revelation calleth the depth or profoundness of Satan; so by argument

of contraries, the just and lawful sovereignty over men's understanding, by force[1] of truth rightly interpreted, is that which approacheth nearest to the similitude of the divine rule.

As for fortune and advancement, the beneficence of learning is not so confined to give fortune only to states and commonwealths, as it doth not likewise give fortune to particular persons. For it was well noted long ago, that Homer hath given more men their livings than either Sylla or Cæsar or Augustus ever did, notwithstanding their great largesses and donatives and distributions of lands to so many legions. And no doubt it is hard to say whether arms or learning have advanced greater numbers. And in case of sovereignty, we see that if arms or descent have carried away the kingdom, yet learning hath carried the priesthood, which ever hath been in some competition with empire.

Again, for the pleasure and delight of knowledge and learning, it far surpasseth all other in nature: for shall the pleasures of the affections so exceed the senses, as much as the obtaining of desire or victory exceedeth a song or a dinner; and must not of consequence the pleasures of the intellect or understanding exceed the pleasures of the affections? We see in all other pleasures there is satiety, and after they be used, their verdure[2] departeth; which sheweth well they be but deceits of pleasure, and not pleasures; and that it was the novelty which pleased, and not the quality. And therefore we see that voluptuous men turn friars, and ambitious princes turn melancholy. But of knowledge there is no satiety, but satisfaction and appetite are perpetually interchangeable; and therefore appeareth to be good in itself simply, without fallacy or accident. Neither is that pleasure of small efficacy and contentment to the mind of man, which the poet Lucretius describeth elegantly,

Suave mari magno, turbantibus æquora ventis, &c.

It is a view of delight (saith he) *to stand or walk upon the shore side, and to see a ship tossed with tempest upon the sea; or to be in a fortified tower, and to see two battles join upon a plain. But it is a pleasure incomparable, for the mind of man to be settled, landed, and fortified in the certainty of truth; and from*

[1] So edd. 1629 and 1633. The original has *face*.
[2] *verdour* in the original and also in edd. 1629 and 1633. See p. 297.

thence to descry and behold the errors, perturbations, labours, and wanderings up and down of other men.

Lastly, leaving the vulgar arguments, that by learning man excelleth man in that wherein man excelleth beasts; that by learning man ascendeth to the heavens and their motions, where in body he cannot come; and the like; let us conclude with the dignity and excellency of knowledge and learning in that whereunto man's nature doth most aspire; which is immortality or continuance; for to this tendeth generation, and raising of houses and families; to this buildings, foundations, and monuments; to this tendeth the desire of memory, fame, and celebration; and in effect, the strength of all other human desires. We see then how far the monuments of wit and learning are more durable than the monuments of power or of the hands. For have not the verses of Homer continued twenty-five hundred years or more, without the loss of a syllable or letter; during which time infinite palaces, temples, castles, cities, have been decayed and demolished? It is not possible to have the true pictures or statuaes of Cyrus, Alexander, Cæsar, no nor of the kings or great personages of much later years; for the originals cannot last, and the copies cannot but leese of the life and truth. But the images of men's wits and knowledges remain in books, exempted from the wrong of time and capable of perpetual renovation. Neither are they fitly to be called images, because they generate still, and cast their seeds in the minds of others, provoking and causing infinite actions and opinions in succeeding ages. So that if the invention of the ship was thought so noble, which carrieth riches and commodities from place to place, and consociateth the most remote regions in participation of their fruits, how much more are letters to be magnified, which as ships pass through the vast seas of time, and make ages so distant to participate of the wisdom, illuminations, and inventions, the one of the other? Nay further, we see some of the philosophers which were least divine and most immersed in the senses and denied generally the immortality of the soul, yet came to this point, that whatsoever motions the spirit of man could act and perform without the organs of the body they thought might remain after death; which were only those of the understanding, and not of the affection; so immortal and incorruptible a thing did knowledge seem unto them to be. But we, that

know by divine revelation that not only the understanding but the affections purified, not only the spirit but the body changed, shall be advanced to immortality, do disclaim in[1] these rudiments of the senses. But it must be remembered both in this last point, and so it may likewise be needful in other places, that in probation of the dignity of knowledge or learning I did in the beginning separate divine testimony from human; which method I have pursued, and so handled them both apart.

Nevertheless I do not pretend, and I know it will be impossible for me by any pleading of mine, to reverse the judgment, either of Æsop's cock, that preferred the barleycorn before the gem; or of Midas, that being chosen judge between Apollo president of the Muses, and Pan god of the flocks, judged for plenty; or of Paris, that judged for beauty and love against wisdom and power; or of Agrippina, *occidat matrem, modo imperet,* [let him kill his mother so he be emperor,] that preferred empire with condition never so detestable; or of Ulysses, *qui vetulam prætulit immortalitati,* [that preferred an old woman to an immortality,] being a figure of those which prefer custom and habit before all excellency; or of a number of the like popular judgments. For these things continue as they have been: but so will that also continue whereupon learning hath ever relied, and which faileth not: *Justificata est sapientia a filiis suis:* [wisdom is justified of her children].

[1] So all three editions. The translation has *nos autem . . . . conculcantes hæc rudimenta atque offucias sensuum, novimus* &c.

THE

SECOND BOOK OF FRANCIS BACON

OF THE

PROFICIENCE AND ADVANCEMENT OF LEARNING

DIVINE AND HUMAN.

TO THE KING.

It might seem to have more convenience, though it come often otherwise to pass, (excellent King,) that those which are fruitful in their generations, and have in themselves the foresight of immortality in their descendants, should likewise be more careful of the good estate of future times; unto which they know they must transmit and commend over their dearest pledges. Queen Elizabeth was a sojourner in the world in respect of her unmarried life; and was a blessing to her own times; and yet so as the impression of her good government, besides her happy memory, is not without some effect which doth survive her.[1] But to your Majesty, whom God hath already blessed with so much royal issue, worthy to continue and represent you for ever, and whose youthful and fruitful bed doth yet promise many the like renovations, it is proper and agreeable to be conversant not only in the transitory parts of good government, but in those acts also which are in their nature permanent and perpetual. Amongst the which (if affection do not transport me) there is not any more worthy than the further endowment of the world with sound and fruitful knowledge: for why should a few received authors stand up like Hercules' Columns, beyond which there should be no sailing or discovering, since we have so bright and benign a star

[1] This last clause is omitted in the translation. See note p. 277.

as your Majesty to conduct and prosper us? To return therefore where we left, it remaineth to consider of what kind those acts are, which have been undertaken and performed by kings and others for the increase and advancement of learning: wherein I purpose to speak actively without digressing or dilating.

Let this ground therefore be laid, that all works are overcomen by amplitude of reward, by soundness of direction, and by the conjunction of labours. The first multiplieth endeavour, the second preventeth error, and the third supplieth the frailty of man. But the principal of these is direction: for *claudus in via antevertit cursorem extra viam;* [the cripple that keeps the way gets to the end of the journey sooner than the runner who goes aside;] and Salomon excellently setteth it down, *If the iron be not sharp, it requireth more strength; but wisdom is that which prevaileth;* signifying that the invention or election of the mean is more effectual than any inforcement or accumulation of endeavours. This I am induced to speak, for that (not derogating from the noble intention of any that have been deservers towards the state of learning) I do observe nevertheless that their works and acts are rather matters of magnificence and memory than of progression and proficience, and tend rather to augment the mass of learning in the multitude of learned men than to rectify or raise the sciences themselves.

The works or acts of merit towards learning are conversant about three objects; the places of learning, the books of learning, and the persons of the learned. For as water, whether it be the dew of heaven or the springs of the earth, doth scatter and leese itself in the ground, except it be collected into some receptacle, where it may by union comfort and sustain itself; and for that cause the industry of man hath made and framed spring-heads, conduits, cisterns, and pools, which men have accustomed likewise to beautify and adorn with accomplishments of magnificence and state, as well as of use and necessity; so this excellent liquor of knowledge, whether it descend from divine inspiration or spring from human sense, would soon perish and vanish to oblivion, if it were not preserved in books, traditions, conferences, and places appointed, as universities, colleges, and schools, for the receipt and comforting of the same.

The works which concern the seats and places of learning are four; foundations and buildings, endowments with revenues, endowments with franchises and privileges, institutions and ordinances for government; all tending to quietness and privateness of life, and discharge of cares and troubles; much like the stations which Virgil prescribeth for the hiving of bees:

> Principio sedes apibus statioque petenda,
> Quo neque sit ventis aditus, &c.
>
> [First for thy bees a quiet station find,
> And lodge them under covert of the wind.[1]]

The works touching books are two: first libraries, which are as the shrines where all the relics of the ancient saints, full of true virtue and that without delusion or imposture[2], are preserved and reposed; secondly, new editions of authors, with more correct impressions, more faithful translations, more profitable glosses, more diligent annotations, and the like.

The works pertaining to the persons of learned men (besides the advancement and countenancing of them in general) are two: the reward and designation of readers in sciences already extant and invented; and the reward and designation of writers and inquirers concerning any parts of learning not sufficiently laboured and prosecuted.

These are summarily the works and acts, wherein the merits of many excellent princes and other worthy personages have been conversant. As for any particular commemorations, I call to mind what Cicero said, when he gave general thanks; *Difficile non aliquem, ingratum quenquam prœterire:* [it were hard to remember all, and yet ungracious to forget any]. Let us rather, according to the Scriptures, look unto that part of the race which is before us than look back to that which is already attained.

First therefore, amongst so many great foundations of colleges in Europe, I find it strange that they are all dedicated to professions, and none left free to arts and sciences at large. For if men judge that learning should be referred to action, they judge well; but in this they fall into the error described in the ancient fable; in which the other parts of the body did suppose the stomach had been idle, because it neither per-

[1] Dryden. [2] This clause is omitted in the *De Augmentis*. See note p. 277.

formed the office of motion, as the limbs do, nor of sense, as the head doth; but yet notwithstanding it is the stomach that digesteth and distributeth to all the rest. So if any man think philosophy and universality to be idle studies, he doth not consider that all professions are from thence served and supplied. And this I take to be a great cause that hath hindered the progression of learning, because these fundamental knowledges have been studied but in passage. For if you will have a tree bear more fruit than it hath used to do, it is not any thing you can do to the boughs, but it is the stirring of the earth and putting new mould about the roots that must work it. Neither is it to be forgotten that this dedicating of foundations and dotations to professory learning hath not only had a malign aspect and influence upon the growth of sciences, but hath also been prejudicial to states and governments. For hence it proceedeth that princes find a solitude in regard of able men to serve them in causes of estate, because there is no education collegiate which is free; where such as were so disposed might give themselves to histories, modern languages, books of policy and civil discourse, and other the like enablements unto service of estate.

And because founders of colleges do plant and founders of lectures do water, it followeth well in order to speak of the defect which is in public lectures; namely, in the smallness and meanness of the salary or reward which in most places is assigned unto them [1]; whether they be lectures of arts, or of professions. For it is necessary to the progression of sciences that readers[2] be of the most able and sufficient men; as those which are ordained for generating and propagating of sciences, and not for transitory use. This cannot be, except their condition and endowment be such as may content the ablest man to appropriate his whole labour and continue his whole age in that function and attendance; and therefore must have a proportion answerable to that mediocrity or competency of advancement which may be expected from a profession or the practice of a profession. So as, if you will have sciences flourish, you must observe David's military law, which was, *That those which staid with the carriage should have equal part with those which were in the action;* else will the carriages be

[1] In the *De Augmentis* he adds *præsertim apud nos.* [2] *i. e.* lecturers.

ill attended: So readers in sciences are indeed the guardians of the stores and provisions of sciences whence men in active courses are furnished, and therefore ought to have equal entertainment with them; otherwise if the fathers in sciences be of the weakest sort or be ill-maintained,

Et patrum invalidi referent jejunia nati:

[the poor keeping of the parents will appear in the poor constitution of the offspring.]

Another defect I note, wherein I shall need some alchemist to help me, who call upon men to sell their books and to build furnaces; quitting and forsaking Minerva and the Muses as barren virgins, and relying upon Vulcan. But certain it is that unto the deep, fruitful, and operative study of many sciences, specially natural philosophy and physic[1], books be not only the instrumentals; wherein also the beneficence of men hath not been altogether wanting; for we see spheres, globes, astrolabes, maps, and the like, have been provided as appurtenances to astronomy and cosmography, as well as books: we see likewise that some places instituted for physic have annexed the commodity of gardens for simples of all sorts, and do likewise command the use of dead bodies for anatomies. But these do respect but a few things. In general, there will hardly be any main proficience in the disclosing of nature, except there be some allowance for expenses about experiments; whether they be experiments appertaining to Vulcanus or Dædalus, furnace or engine, or any other kind; and therefore as secretaries and spials of princes and states bring in bills for intelligence, so you must allow the spials and intelligencers of nature to bring in their bills, or else you shall be ill advertised.

And if Alexander made such a liberal assignation to Aristotle of treasure for the allowance of hunters, fowlers, fishers, and the like, that he might compile an History of nature, much better do they deserve it that travail[2] in Arts of nature.[3]

Another defect which I note, is an intermission or neglect in

[1] *i. e.* medicine.

[2] *travailes* in the original, and also in edd. 1629 and 1633.

[3] *i. e.* in working upon and altering nature by art. The meaning is expressed more clearly in the translation: *majus quiddam debetur iis qui non in saltibus naturæ pererrant, sed in labyrinthis artium viam aperiunt:* the compiler of a history of nature being likened to a wanderer through the woods, the "travailer in arts of nature" to one who makes his way through a labyrinth.

those which are governors in universities of consultation, and in princes or superior persons of visitation; to enter into account and consideration, whether the readings, exercises, and other customs appertaining unto learning, anciently begun and since continued, be well instituted or no; and thereupon to ground an amendment or reformation in that which shall be found inconvenient. For it is one of your Majesty's own most wise and princely maxims, *that in all usages and precedents, the times be considered wherein they first began; which if they were weak or ignorant, it derogateth from the authority of the usage, and leaveth it for suspect.* And therefore in as much as most of the usages and orders of the universities were derived from more obscure times, it is the more requisite they be re-examined. In this kind I will give an instance or two for example sake, of things that are the most obvious and familiar. The one is a matter which though it be ancient and general, yet I hold to be an error; which is, that scholars in universities come too soon and too unripe to logic and rhetoric; arts fitter for graduates than children and novices: for these two, rightly taken, are the gravest of sciences; being the arts of arts, the one for judgment, the other for ornament; and they be the rules and directions how to set forth and dispose matter; and therefore for minds empty and unfraught with matter, and which have not gathered that which Cicero calleth *sylva* and *supellex*, stuff and variety, to begin with those arts, (as if one should learn to weigh or to measure or to paint the wind,) doth work but this effect, that the wisdom of those arts, which is great and universal, is almost made contemptible, and is degenerate into childish sophistry and ridiculous affectation. And further, the untimely learning of them hath drawn on by consequence the superficial and unprofitable teaching and writing of them, as fitteth indeed to the capacity of children. Another is a lack I find in the exercises used in the universities, which do make too great a divorce between invention and memory; for their speeches are either premeditate *in verbis conceptis*, where nothing is left to invention, or merely *extemporal*, where little is left to memory: whereas in life and action there is least use of either of these, but rather of intermixtures of premeditation and invention, notes and memory; so as the exercise fitteth not the practice, nor the image the life; and it is ever a true rule in exercises, that they be framed as near as may be to the

life of practice; for otherwise they do pervert the motions and faculties of the mind, and not prepare them. The truth whereof is not obscure, when scholars come to the practices of professions, or other actions of civil life; which when they set into, this want is soon found by themselves, and sooner by others. But this part, touching the amendment of the institutions and orders of universities, I will conclude with the clause of Cæsar's letter to Oppius and Balbus, *Hoc quemadmodum fieri possit, nonnulla mihi in mentem veniunt, et multa reperiri possunt; de iis rebus rogo vos ut cogitationem suscipiatis:* [how this may be done, some things occur to me and more may be thought of. I would have you take these matters into consideration.]

Another defect which I note, ascendeth a little higher than the precedent. For as the proficience of learning consisteth much in the orders and institutions of universities in the same states and kingdoms, so it would be yet more advanced, if there were more intelligence mutual between the universities of Europe than now there is. We see there be many orders and foundations, which though they be divided under several sovereignties and territories, yet they take themselves to have a kind of contract, fraternity, and correspondence one with the other, insomuch as they have Provincials and Generals.[1] And surely as nature createth brotherhood in families, and arts mechanical contract brotherhoods in communalties, and the anointment of God superinduceth a brotherhood in kings and bishops; so in like manner there cannot but be a fraternity in learning and illumination, relating to that paternity which is attributed to God, who is called the Father of illuminations or lights.

The last defect which I will note is, that there hath not been, or very rarely been, any public designation of writers or inquirers concerning such parts of knowledge as may appear not to have been already sufficiently laboured or undertaken; unto which point it is an inducement, to enter into a view and examination what parts of learning have been prosecuted, and what omitted; for the opinion of plenty is amongst the causes of want, and the great quantity of books maketh a shew rather of superfluity than lack; which surcharge nevertheless is not to be remedied by making no more books, but by making more

[1] *Præfectos (alios provinciales, alios generales) quibus omnes parent.* —De Aug.

good books, which, as the serpent of Moses[1], might devour the serpents of the enchanters.

The removing of all the defects formerly enumerate, except the last, and of the active part also of the last, (which is the designation of writers,) are *opera basilica,* [works for a king;] towards which the endeavours of a private man may be but as an image in a crossway, that may point at the way but cannot go it. But the inducing part of the latter (which is the survey of learning) may be set forward by private travel. Wherefore I will now attempt to make a general and faithful perambulation of learning, with an inquiry what parts thereof lie fresh and waste, and not improved and converted by the industry of man; to the end that such a plot made and recorded to memory may both minister light to any public designation, and also serve to excite voluntary endeavours; wherein nevertheless my purpose is at this time to note only omissions and deficiencies, and not to make any redargution of errors or incomplete prosecutions[2]; for it is one thing to set forth what ground lieth unmanured, and another thing to correct ill husbandry in that which is manured.[3]

In the handling and undertaking of which work I am not ignorant what it is that I do now move and attempt, nor insensible of mine own weakness to sustain my purpose; but my hope is that if my extreme love to learning carry me too far, I may obtain the excuse of affection; for that *it is not granted to man to love and to be wise.* But I know well I can use no other liberty of judgment than I must leave to others; and I for my part shall be indifferently glad either to perform myself or accept from another that duty of humanity, *Nam qui erranti comiter monstrat viam,* &c. [to put the wanderer in the right way]. I do foresee likewise that of those things which I shall enter and register as deficiencies and omissions, many will conceive and censure that some of them are already done and extant; others to be but curiosities, and things of no great use; and others to be of too great difficulty and almost impossibility to be compassed and effected. But for the two first, I refer myself to the particulars. For the last, touching impossibility, I take it those things are to be held possible which may be done by some person, though not by every one; and which

[1] Not Moses, but Aaron. Ex. i. 17.—*R. L. E.*

[2] *infelicitates.*—De Aug.

[3] *i. e.* cultivated.

may be done by many, though not by any one; and which may be done in succession of ages, though not within the hour-glass of one man's life; and which may be done by public designation, though not by private endeavour. But notwithstanding, if any man will take to himself rather that of Salomon, *Dicit piger, Leo est in via,* [the slothful man saith there is a lion in the path,] than that of Virgil, *Possunt quia posse videntur,* [they find it possible because they think it possible,] I shall be content that my labours be esteemed but as the better sort of wishes; for as it asketh some knowledge to demand a question not impertinent, so it requireth some sense to make a wish not absurd.

¶ [1] The parts of human learning have reference to the three parts of Man's Understanding, which is the seat of learning: History to his Memory, Poesy to his Imagination, and Philosophy to his Reason. Divine learning receiveth the same distribution; for the spirit of man is the same, though the revelation of oracle and sense be diverse: so as theology consisteth also of History of the Church; of Parables, which is divine poesy; and of holy Doctrine or precept. For as for that part which seemeth supernumerary, which is Prophecy, it is but divine history; which hath that prerogative over human, as the narration may be before the fact as well as after.

Historia Literarum.

¶ [2] History is Natural, Civil, Ecclesiastical, and Literary; whereof the three first I allow as extant, the fourth I note as deficient. For no man hath propounded to himself the general state of learning to be described and represented from age to age, as many have done the works of nature and the state civil and ecclesiastical; without which

[1] De Aug. ii. 1. The substance of the following paragraph will be found considerably expanded in the first chapter of the *Descriptio Globi Intellectualis,* and set forth much more clearly and orderly in the first chapter of the second book of the *De Augmentis;* which begins here; the previous observations being introductory. As it may be convenient to the reader to have the means of referring at once to the corresponding passages of the more finished work, I shall mark with a ¶ the places where the several chapters begin; adding (where the case admits of it) some notice, more or less complete, of the differences between the two. See Preface, p. 255.

[2] De Aug. ii. 4. In the translation the divisions are altered: History being divided into Natural and Civil,—History of Nature and History of Man; and Literary and Ecclesiastical History being considered as separate departments of the latter. See chap. 2. paragraph 1. This alteration induces an alteration in the order of treatment; the precedence being given to the History of Nature, which is the subject of the second chapter.

the history of the world seemeth to me to be as the statua of Polyphemus with his eye out; that part being wanting which doth most shew the spirit and life of the person. And yet I am not ignorant that in divers particular sciences, as of the jurisconsults, the mathematicians, the rhetoricians, the philosophers, there are set down some small memorials of the schools, authors, and books; and so likewise some barren relations touching the invention of arts or usages. But a just story of learning, containing the antiquities and originals of knowledges, and their sects; their inventions, their traditions; their diverse administrations and managings; their flourishings, their oppositions, decays, depressions, oblivions, removes; with the causes and occasions of them, and all other events concerning learning, throughout the ages of the world[1]; I may truly affirm to be wanting. The use and end of which work I do not so much design for curiosity, or satisfaction of those that are the lovers of learning; but chiefly for a more serious and grave purpose, which is this in few words, that it will make learned men wise in the use and administration of learning. For it is not St. Augustine's nor St. Ambrose works that will make so wise a divine, as ecclesiastical history throughly read and observed; and the same reason is of learning.

¶ [2]History of Nature is of three sorts; of nature in course, of nature erring or varying, and of nature altered or wrought; that is, history of Creatures, history of Marvels, and history of Arts.[3] The first of these no doubt is extant, and that in good perfection; the two later are handled so weakly and unprofitably, as I am moved to note them as deficient. For I find no sufficient or competent collection of the works of nature which have a digression and deflexion from the ordinary course of generations, productions, and motions; whether they be singularities of place and region, or the strange events of time and chance, or the effects of yet unknown proprieties, or the instances of exception to general kinds. It is true, I find a number of books of fabulous experiments and secrets, and frivolous impostures for pleasure and

Historia Naturæ Errantis.

[1] The description of the required history is set forth much more particularly in the translation; and the whole paragraph rewritten and enlarged.

[2] De Aug ii. 2.

[3] This division is retained in the translation, but the exposition of it is extended into a long paragraph.

strangeness. But a substantial and severe collection of the Heteroclites or Irregulars of nature, well examined and described, I find not; specially not with due rejection of fables and popular errors: for as things now are, if an untruth in nature be once on foot, what by reason of the neglect of examination and countenance of antiquity, and what by reason of the use of the opinion in similitudes and ornaments of speech, it is never called down.

The use of this work, honoured with a precedent in Aristotle[1], is nothing less than to give contentment to the appetite of curious and vain wits, as the manner of Mirabilaries is to do; but for two reasons, both of great weight; the one to correct the partiality of axioms and opinions, which are commonly framed only upon common and familiar examples; the other because from the wonders of nature is the nearest intelligence and passage towards the wonders of art: for it is no more but by following and as it were hounding Nature in her wanderings, to be able to lead her afterwards to the same place again. Neither am I of opinion, in this History of Marvels, that superstitious narrations of sorceries, witchcrafts, dreams, divinations, and the like, where there is an assurance and clear evidence of the fact, be altogether excluded. For it is not yet known in what cases, and how far, effects attributed to superstition do participate of natural causes; and therefore howsoever the practice of such things is to be condemned, yet from the speculation and consideration of them light may be taken, not only for the discerning of the offences, but for the further disclosing of nature. Neither ought a man to make scruple of entering into these things for inquisition of truth, as your Majesty hath shewed in your own example; who with the two clear eyes of religion and natural philosophy have looked deeply and wisely into these shadows, and yet proved yourself to be of the nature of the sun, which passeth through pollutions and itself remains as pure as before. But this I hold fit, that these narrations which have mixture with superstition be sorted by themselves, and not to be mingled with the narrations which are merely and sincerely natural. But as for the narrations touching the

[1] De Miris Auscultationibus; which is now however generally admitted to be not Aristotle's.— *R. L. E.* See De Aug. ii. 2. Mr. Blakesley is of opinion that the nucleus of it was probably Aristotle's, but that it has been added to by subsequent writers.

prodigies and miracles of religions, they are either not true or not natural; and therefore impertinent for the story of nature.

Historia Mechanica.

For History of Nature Wrought or Mechanical, I find some collections made of agriculture, and likewise of manual arts; but commonly with a rejection of experiments familiar and vulgar. For it is esteemed a kind of dishonour unto learning to descend to inquiry or meditation upon matters mechanical, except they be such as may be thought secrets, rarities, and special subtilties; which humour of vain and supercilious arrogancy is justly derided in Plato; where he brings in Hippias, a vaunting sophist, disputing with Socrates, a true and unfeigned inquisitor of truth; where the subject being touching beauty, Socrates, after his wandering manner of inductions, put first an example of a fair virgin, and then of a fair horse, and then of a fair pot well glazed, whereat Hippias was offended, and said, *More than for courtesy's sake, he did think much to dispute with any that did allege such base and sordid instances:* whereunto Socrates answereth, *You have reason, and it becomes you well, being a man so trim in your vestiments,* &c. and so goeth on in an irony. But the truth is, they be not the highest instances that give the securest information; as may be well expressed in the tale so common of the philosopher, that while he gazed upwards to the stars fell into the water; for if he had looked down he might have seen the stars in the water, but looking aloft he could not see the water in the stars. So it cometh often to pass that mean and small things discover great better than great can discover the small; and therefore Aristotle noteth well, *that the nature of every thing is best seen in his smallest portions,* and for that cause he inquireth the nature of a commonwealth, first in a family, and the simple conjugations of man and wife, parent and child, master and servant, which are in every cottage: even so likewise the nature of this great city of the world and the policy thereof must be first sought in mean concordances and small portions. So we see how that secret of nature, of the turning of iron touched with the loadstone towards the north, was found out in needles of iron, not in bars of iron.

But if my judgment be of any weight, the use of History Mechanical is of all others the most radical and fundamental towards natural philosophy; such natural philosophy as shall not vanish in the fume of subtile, sublime, or delectable specu-

lation, but such as shall be operative to the endowment and benefit of man's life: for it will not only minister and suggest for the present many ingenious practices in all trades, by a connexion and transferring of the observations of one art to the use of another, when the experiences of several mysteries shall fall under the consideration of one man's mind; but further it will give a more true and real illumination concerning causes and axioms than is hitherto attained. For like as a man's disposition is never well known till he be crossed, nor Proteus ever changed shapes till he was straitened and held fast; so the passages and variations of nature cannot appear so fully in the liberty of nature, as in the trials and vexations of art.[1]

¶[2] For Civil History, it is of three kinds[3]; not unfitly to be compared with the three kinds of pictures or images. For of pictures or images, we see some are unfinished, some are perfect[4], and some are defaced. So of histories we may find three kinds, Memorials, Perfect Histories, and Antiquities; for Memorials are history unfinished, or the first or rough draughts of history, and Antiquities are history defaced, or some remnants of history which have casually escaped the shipwrack of time.

Memorials, or Preparatory History, are of two sorts; whereof the one may be termed Commentaries, and the other Registers. Commentaries are they which set down a continuance of the naked events and actions, without the motives or designs, the counsels, the speeches, the pretexts, the occasions, and other passages of action: for this is the true nature of a Commentary; though Cæsar, in modesty mixed with greatness, did for his pleasure apply the name of a Commentary to the best history of the world. Registers are collections of public acts, as decrees of council, judicial proceedings, declarations and letters of estate, orations, and the like, without a perfect continuance or contexture of the thread of the narration.

[1] A paragraph is added in the translation, to say that not the mechanical arts only but also the practical part of the liberal sciences, as well as many crafts which have not grown into formal arts (such, he means, as hunting, fishing, &c.), are to be included in the History Mechanical.

[2] De Aug. ii. 6. The 3rd chapter, concerning the two uses of natural history, and the 5th concerning the dignity and difficulty of civil history, have nothing corresponding to them here.

[3] "I am not altogether ignorant in the laws of history and of the kinds. The same hath been taught by many, but by no man better and with greater brevity than by that excellent learned gentleman Sir Francis Bacon."—*Ralegh:* Preface to the *History of the World.*— *R. L. E.*

[4] *parfite* in the original; the form in which the word was commonly written in Bacon's time.

Antiquities or Remnants of History are, as was said, *tanquam tabula naufragii*, [like the planks of a shipwreck;] when industrious persons by an exact and scrupulous diligence and observation, out of monuments, names, words, proverbs, traditions, private records and evidences, fragments of stories, passages of books that concern not story, and the like, do save and recover somewhat from the deluge of time.

In these kinds of unperfect histories I do assign no deficience, for they are *tanquam imperfecte mista*, [things imperfectly compounded;] and therefore any deficience in them is but their nature. As for the corruptions and moths of history, which are Epitomes, the use of them deserveth to be banished, as all men of sound judgment have confessed; as those that have fretted and corroded the sound bodies of many excellent histories, and wrought them into base and unprofitable dregs.

¶ [1] History which may be called Just and Perfect History is of three kinds, according to the object which it propoundeth, or pretendeth to represent: for it either representeth a Time, or a Person, or an Action. The first we call Chronicles, the second Lives, and the third Narrations or Relations. Of these, although the first be the most complete and absolute kind of history and hath most estimation and glory, yet the second excelleth it in profit and use, and the third in verity and sincerity. For History of Times representeth the magnitude of actions and the public faces and deportments of persons, and passeth over in silence the smaller passages and motions of men and matters. But such being the workmanship of God as he doth hang the greatest weight upon the smallest wires, *maxima e minimis suspendens*, it comes therefore to pass, that such histories do rather set forth the pomp of business than the true and inward resorts thereof.[2] But Lives, if they be well written [3], propounding to themselves a person to represent in whom actions both greater and smaller, public and private, have a commixture, must of necessity contain a more true, native, and lively representation. So again Narrations and Relations of actions, as the War of Peloponnesus, the Expedition of Cyrus

[1] De Aug. ii. 7.

[2] And even (he adds in the translation) where they attempt to give the counsels and motives, yet still out of the same love of dignity and greatness they introduce into men's actions more gravity and wisdom than they really have; insomuch that you may find a truer picture of human life in some satires than in such histories.

[3] *i. e.* not mere eulogies. The translation adds: "neque enim de elogiis et hujusmodi commemorationibus jejunis loquimur."

Minor, the Conspiracy of Catiline, cannot but be more purely and exactly true than Histories of Times, because they may choose an argument comprehensible within the notice and instructions of the writer: whereas he that undertaketh the story of a time, especially of any length, cannot but meet with many blanks and spaces which he must be forced to fill up out of his own wit and conjecture.[1]

For the History of Times, (I mean of civil history) the providence of God hath made the distribution: for it hath pleased God to ordain and illustrate two exemplar states of the world, for arms, learning, moral virtue, policy, and laws; the state of Græcia, and the state of Rome; the histories whereof occupying the middle part of time, have more ancient to them, histories which may by one common name be termed the Antiquities of the World; and after them, histories which may be likewise called by the name of Modern History.[2]

Now to speak of the deficiencies. As to the Heathen Antiquities of the world, it is in vain to note them for deficient. Deficient they are no doubt, consisting most of fables and fragments; but the deficience cannot be holpen; for antiquity is like fame, *caput inter nubila condit*, her head is muffled from our sight. For the History of the Exemplar States, it is extant in good perfection. Not but I could wish there were a perfect course of history for Græcia from Theseus to Philopœmen, (what time the affairs of Græcia drowned and extinguished in the affairs of Rome;) and for Rome from Romulus to Justinianus, who may be truly said to be *ultimus Romanorum*. In which sequences of story the text of Thucydides and Xenophon in the one, and the texts of Livius, Polybius, Sallustius, Cæsar, Appianus, Tacitus, Herodianus in the other, to be kept entire without any diminution at all, and only to be supplied and continued. But this is matter of magnificence, rather to be com-

[1] On the other hand it must be confessed (he reminds us in the translation,—I give only the general import of the passage, which is of considerable length) that relations of this kind, especially if published near the time to which they refer, are in one respect of all narratives the most to be suspected; being commonly written either in favour or in spite. But then again it seldom happens that they are all on one side, so that the extreme views of each party being represented, an honest and judicious historian may, when the violence of faction has cooled down with time, find the truth among them.

[2] This paragraph and the next are omitted in the translation, and their place supplied by a general complaint that very many particular histories are still wanting; much to the injury in honour and reputation of the kingdoms and commonwealths which they concern.

mended than required: and we speak now of parts of learning supplemental, and not of supererogation.

But for Modern Histories, whereof there are some few very worthy, but the greater part beneath mediocrity, leaving the care of foreign stories to foreign states, because I will not be *curiosus in aliena republica*, [a meddler in other nations' matters,] I cannot fail to represent to your Majesty the unworthiness of the history of England in the main continuance thereof, and the partiality and obliquity of that of Scotland in the latest and largest author that I have seen; supposing that it would be honour for your Majesty and a work very memorable, if this island of Great Britain[1], as it is now joined in monarchy for the ages to come, so were joined in one history for the times passed; after the manner of the sacred history, which draweth down the story of the Ten Tribes and of the Two Tribes as twins together. And if it shall seem that the greatness of this work may make it less exactly performed, there is an excellent period of a much smaller compass of time, as to the story of England; that is to say, from the Uniting of the Roses to the Uniting of the Kingdoms; a portion of time, wherein to my understanding, there hath been the rarest varieties that in like number of successions of any hereditary monarchy hath been known. For it beginneth with the mixed adeption of a crown, by arms and title; an entry by battle, an establishment by marriage; and therefore times answerable, like waters after a tempest, full of working and swelling, though without extremity of storm; but well passed through by the wisdom of the pilot, being one of the most sufficient kings of all the number. Then followeth the reign of a king, whose actions, howsoever conducted[2], had much intermixture with the affairs of Europe, balancing and inclining them variably; in whose time also began that great alteration in the state ecclesiastical, an action which seldom cometh upon the stage: then the reign of a minor: then an offer of an usurpation, though it was but as *febris ephemera*, [a diary ague:] then the reign of a queen matched with a foreigner: then

[1] Spelt *Britanie* in the original; *Brittany* in edd. 1629 and 1633.

[2] The distinction between the father and the son is more clearly marked in the translation. Of Henry VII. he says *qui unus inter antecessores reges* consilio *enituit*; of Henry VIII.'s actions, *licet magis impetu quam consilio administratæ*. Had Bacon gone on with his history of Henry VIII. it would have been curious to contrast the portrait of the son governing more by passion than policy, with that of the father governing by policy without passion.

of a queen that lived solitary and unmarried, and yet her government so masculine as it had greater impression and operation upon the states abroad than it any ways received from thence[1]: and now last, this most happy and glorious event, that this island of Britain, divided from all the world, should be united in itself; and that oracle of rest given to Æneas, *Antiquam exquirite matrem*, [seek out your ancient mother,] should now be performed and fulfilled upon the nations of England and Scotland, being now reunited in the ancient mother name of Britain, as a full period of all instability and peregrinations: so that as it cometh to pass in massive bodies, that they have certain trepidations and waverings before they fix and settle; so it seemeth that by the providence of God this monarchy, before it was to settle in your Majesty and your generations, (in which I hope it is now established for ever,) it had these prelusive changes and varieties.

For Lives, I do find strange that these times have so little esteemed the virtues of the times, as that the writing of lives should be no more frequent. For although there be not many sovereign princes or absolute commanders, and that states are most collected into monarchies, yet are there many worthy personages that deserve better than dispersed report or barren elogies. For herein the invention of one of the late poets[2] is proper, and doth well enrich the ancient fiction: for he feigneth that at the end of the thread or web of every man's life there was a little medal containing the person's name, and that Time waited upon the shears, and as soon as the thread was cut, caught the medals and carried them to the river of Lethe; and about the bank there were many birds flying up and down, that would get the medals and carry them in their beak a little while, and then let them fall into the river: only there were a few swans, which if they got a name, would carry it to a temple where it was conseerate. And although many men more mortal in their affections than in their bodies, do esteem desire of name and memory but as a vanity and ventosity,

Animi nil magnæ laudis egentes;

[souls that have no care for praise;] which opinion cometh

[1] This last clause is omitted in the *De Augmentis*. See note p. 277.

[2] Ariosto, *Orlando Furioso*; at the end of the 34th and the beginning of the 35th books.

from that root, *non prius laudes contempsimus, quam laudanda facere desivimus;* [men hardly despise praise till they have ceased to deserve it;] yet that will not alter Salomon's judgment, *Memoria justi cum laudibus, at impiorum nomen putrescet;* [the memory of the just is blessed; but the name of the wicked shall rot;] the one flourisheth, the other either consumeth to present oblivion, or turneth to an ill odour. And therefore in that style or addition, which is and hath been long well received and brought in use, *felicis memoriæ, piæ memoriæ, bonæ memoriæ,* [of happy, of pious, of good memory,] we do acknowledge that which Cicero saith, borrowing it from Demosthenes, that *bona fama propria possessio defunctorum* [1]; [good fame is all that a dead man can possess;] which possession I cannot but note that in our times it lieth much waste, and that therein there is a deficience.

For Narrations and Relations of particular actions, there were also to be wished a greater diligence therein; for there is no great action but hath some good pen which attends it. And because it is an ability not common to write a good history, as may well appear by the small number of them; yet if particularity of actions memorable were but tolerably reported as they pass, the compiling of a complete History of Times might be the better expected, when a writer should arise that were fit for it: for the collection of such relations might be as a nursery garden, whereby to plant a fair and stately garden when time should serve.

¶ [2] There is yet another portion of history which Cornelius Tacitus maketh, which is not to be forgotten, specially with that application which he accoupleth it withal, Annals and Journals: appropriating to the former matters of estate, and to the later acts and accidents of a meaner nature. For giving but a touch of certain magnificent buildings, he addeth, *Cum ex dignitate populi Romani repertum sit, res illustres annalibus, talia diurnis urbis actis mandare:* [that it had been thought suitable to the dignity of the Roman people to enter in their *annals* only matters of note and greatness; leaving such things as these to the *journal records* of the city.] So as there is a

[1] Compare Cicero, Philippic. 9. 5., with the opening of the λόγος ἐπιτάφιος, 1389–10.

[2] De Aug. ii. 9. Between this paragraph and the last there is introduced in the translation a chapter on the advantages and disadvantages of histories of the world, as distinguished from histories of particular countries.

kind of contemplative heraldry, as well as civil. And as nothing doth derogate from the dignity of a state more than confusion of degrees; so it doth not a little embase the authority of an history, to intermingle matters of triumph or matters of ceremony or matters of novelty with matters of state. But the use of a Journal hath not only been in the history of times [1], but likewise in the history of persons, and chiefly of actions; for princes in ancient time had, upon point of honour and policy both, journals kept of what passed day by day: for we see the Chronicle which was read before Ahasuerus [2], when he could not take rest, contained matter of affairs indeed, but such as had passed in his own time, and very lately before: but the Journal of Alexander's house expressed every small particularity, even concerning his person and court [3]; and it is yet an use well received in enterprises memorable, as expeditions of war, navigations, and the like, to keep diaries of that which passeth continually.

¶ [4] I cannot likewise be ignorant of a form of writing which some grave and wise men have used, containing a scattered history of those actions which they have thought worthy of memory, with politic discourse and observation thereupon; not incorporate into the history, but separately, and as the more principal in their intention; which kind of Ruminated History I think more fit to place amongst books of policy, whereof we shall hereafter speak, than amongst books of history [5]; for it is the true office of history to represent the events themselves together with the counsels, and to leave the observations and conclusions thereupon to the liberty and faculty of every man's judgment. But mixtures are things irregular, whereof no man can define.

So also is there another kind of history manifoldly mixed,

[1] *time* in the original and also in edd. 1629 and 1633. The translation omits this clause.

[2] Esther, vi. 1.

[3] Not that greater matters were excluded; but great and small were entered promiscuously as they occurred. (*Neque enim sicut annales tantum gravia, ita diaria tantum levia complexa sunt; sed omnia promiscue et cursim diariis excipiebantur, seu majoris seu minoris momenti.*)

[4] De Aug. ii. 10.

[5] This remark is omitted in the translation, and another substituted, to the effect that this kind of ruminated history is an excellent thing, provided it be understood that the matter in hand is not history but observations upon history (*modo hujusmodi scriptor hoc agat et hoc se agere confiteatur*); for in a regular history the narrative ought not, he says, to be interrupted by comments of this kind. It should be pregnant with politic precepts, but the writer should not play the midwife.

and that is History of Cosmography: being compounded of natural history, in respect of the regions themselves; of history civil, in respect of the habitations, regiments, and manners of the people; and the mathematics, in respect of the climates and configurations towards the heavens: which part of learning of all others in this latter time hath obtained most proficience. For it may be truly affirmed to the honour of these times, and in a virtuous emulation with antiquity, that this great building of the world had never through-lights made in it, till the age of us and our fathers; for although they had knowledge of the antipodes,

> Nosque ubi primus equis oriens afflavit anhelis,
> Illic sera rubens accendit lumina Vesper:
> [And while on us the fresh East breathes from far,
> For them the red West lights her evening star:]

yet that might be by demonstration, and not in fact; and if by travel, it requireth the voyage but of half the globe. But to circle the earth, as the heavenly bodies do, was not done nor enterprised till these later times: and therefore these times may justly bear in their word, not only *plus ultra*, in precedence of the ancient *non ultra*, and *imitabile fulmen* in precedence of the ancient *non imitabile fulmen*,

> Demens qui nimbos et non imitabile fulmen &c.

but likewise *imitabile cœlum;* in respect of the many memorable voyages, after the manner of heaven, about the globe of the earth.

And this proficience in navigation and discoveries may plant also an expectation of the further proficience and augmentation of all sciences; because it may seem they are ordained by God to be coevals, that is, to meet in one age. For so the prophet Daniel speaking of the latter times foretelleth, *Plurimi pertransibunt, et multiplex erit scientia:* [many shall pass to and fro, and knowledge shall be multiplied:] as if the openness and through passage of the world and the increase of knowledge were appointed to be in the same ages; as we see it is already performed in great part; the learning of these later times not much giving place to the former two periods or returns of learning, the one of the Grecians, the other of the Romans.

¶ [1] History Ecclesiastical receiveth the same divisions with

[1] De Aug. ii. 11.

History Civil: but further in the propriety thereof may be divided into History of the Church, by a general name; History of Prophecy; and History of Providence. The first describeth the times of the militant church; whether it be fluctuant, as the ark of Noah; or moveable, as the ark in the wilderness; or at rest, as the ark in the temple; that is, the state of the church in persecution, in remove, and in peace. This part I ought in no sort to note as deficient; only I would that the virtue and sincerity of it were according to the mass and quantity. But I am not now in hand with censures, but with omissions.

The second, which is History of Prophecy, consisteth of two relatives, the prophecy and the accomplishment; and therefore the nature of such a work ought to be, that every prophecy of the scripture be sorted with the event fulfilling the same, throughout the ages of the world; both for the better confirmation of faith, and for the better illumination of the church touching those parts of prophecies which are yet unfulfilled; allowing nevertheless that latitude which is agreeable and familiar unto divine prophecies; being of the nature of their author, with whom a thousand years are but as one day; and therefore are not fulfilled punctually at once, but have springing and germinant accomplishment throughout many ages, though the height or fulness of them may refer to some one age. This is a work which I find deficient, but is to be done with wisdom, sobriety, and reverence, or not at all. *Historia Prophetica.*

The third, which is History of Providence, containeth that excellent correspondence which is between God's revealed will and his secret will; which though it be so obscure as for the most part it is not legible to the natural man; no, nor many times to those that behold it from the tabernacle; yet at some times it pleaseth God, for our better establishment and the confuting of those which are as without God in the world, to write it in such text and capital letters that, as the prophet saith, *he that runneth by may read it* [1]; that is, mere sensual persons, which hasten by God's judgments and never bend or fix their

[1] Habak. ii. 2. Mr. Ellis has remarked in his note on the corresponding passage in the *De Augmentis* that this expression, now so familiar and almost proverbial, is in fact a misquotation of the text and a misrepresentation of the meaning of the prophet. "Write the vision and make it plain upon the tables that he may run that readeth it." It would be a curious inquiry, who first made this mistake.

cogitations upon them, are nevertheless in their passage and race urged to discern it. Such are the notable events and examples of God's judgments, chastisements, deliverances, and blessings. And this is a work which hath passed through the labour of many[1], and therefore I cannot present as omitted.

¶ [2] There are also other parts of learning which are Appendices to history. For all the exterior proceedings of man consist of words and deeds; whereof history doth properly receive and retain in memory the deeds, and if words, yet but as inducements and passages to deeds; so are there other books and writings, which are appropriate to the custody and receit of words only; which likewise are of three sorts; Orations, Letters, and Brief Speeches or Sayings. Orations are pleadings, speeches of counsel; laudatives, invectives, apologies, reprehensions; orations of formality or ceremony, and the like. Letters are according to all the variety of occasions; advertisements, advices, directions, propositions, petitions, commendatory, expostulatory, satisfactory, of compliment, of pleasure, of discourse, and all other passages of action. And such as are written from wise men are, of all the words of man, in my judgment the best; for they are more natural than orations and public speeches, and more advised than conferences or present speeches. So again letters of affairs from such as manage them or are privy to them are of all others the best instructions for history, and to a diligent reader the best histories in themselves. For Apophthegms, it is a great loss of that book of Cæsar's; for as his history and those few letters of his which we have and those apophthegms which were of his own excel all men's else, so I suppose would his collection of Apophthegms have done; for as for those which are collected by others, either I have no taste in such matters, or else their choice hath not been happy.[3] But upon these three kinds of writings I do not insist, because I have no deficiences to propound concerning them.

Thus much therefore concerning History; which is that part

[1] In the translation he says, "*sane in calamos nonnullorum piorum virorum incidit*, sed non sine partium studio." Indeed it is difficult to see how, without partiality, such a history of Providence could be written at all. For take any signal calamity and look at it in its historical character only,— who shall say whether it is a chastisement or a martyrdom? a judgment upon the sinner, or a trial of the saint?

[2] De Aug. ii. 12.

[3] Some further remarks upon the value and use of Apophthegms are introduced in the *De Augmentis:* of these, a translation will be given in my preface to Bacon's own collection of Apophthegms.

of learning which answereth to one of the cells, domiciles, or offices of the mind of man; which is that of the Memory.

¶ [1] Poesy is a part of learning in measure of words for the most part restrained, but in all other points extremely licensed, and doth truly refer to the Imagination; which, being not tied to the laws of matter, may at pleasure join that which nature hath severed, and sever that which nature hath joined, and so make unlawful matches and divorces of things: *Pictoribus atque poetis*, &c. [Painters and Poets have always been allowed to take what liberties they would.] It is taken in two senses, in respect of words or matter. In the first sense it is but a character of style, and belongeth to arts of speech, and is not pertinent for the present.[2] In the later, it is (as hath been said) one of the principal portions of learning, and is nothing else but Feigned History, which may be styled as well in prose as in verse.

The use of this Feigned History hath been to give some shadow of satisfaction to the mind of man in those points wherein the nature of things doth deny it; the world being in proportion inferior to the soul; by reason whereof there is agreeable to the spirit of man a more ample greatness, a more exact goodness, and a more absolute variety, than can be found in the nature of things. Therefore, because the acts or events of true history have not that magnitude which satisfieth the mind of man, poesy feigneth acts and events greater and more heroical; because true history propoundeth the successes and issues of actions not so agreeable to the merits of virtue and vice, therefore poesy feigns them more just in retribution, and more according to revealed providence; because true history representeth actions and events more ordinary and less interchanged, therefore poesy endueth them with more rareness, and more unexpected and alternative variations. So as it appeareth that poesy serveth and conferreth to magnanimity, morality, and to delectation. And therefore it was ever thought to have some participation of divineness, because it doth raise and erect the mind, by submitting the shews of things to the desires of

[1] De Aug. ii. 13. The arrangement is partly altered in the translation, and much new matter introduced: among the rest, a whole paragraph concerning the true use and dignity of dramatic poetry, as a vehicle of moral instruction; which is connected in a striking manner with the remark that men in bodies are more open to impressions than when alone.

[2] A sentence is added in the translation to explain that under this head satires, elegies, epigrams, and odes are included.

the mind; whereas reason doth buckle and bow the mind unto the nature of things. And we see that by these insinuations and congruities with man's nature and pleasure, joined also with the agreement and consort it hath with music, it hath had access and estimation in rude times and barbarous regions, where other learning stood excluded.

The division of poesy which is aptest in the propriety thereof, (besides those divisions which are common unto it with history, as feigned chronicles, feigned lives; and the appendices of history, as feigned epistles, feigned orations, and the rest;) is into Poesy Narrative, Representative, and Allusive. The Narrative is a mere imitation of history, with the excesses before remembered; choosing for subject commonly wars and love, rarely state, and sometimes pleasure or mirth.[1] Representative is as a visible history, and is an image of actions as if they were present, as history is of actions in nature as they are, (that is) past. Allusive or Parabolical is a narration applied only to express some special purpose or conceit.[2] Which later kind of parabolical wisdom was much more in use in the ancient times, as by the fables of Æsop and the brief sentences of the Seven and the use of hieroglyphics may appear. And the cause was, for that it was then of necessity to express any point of reason which was more sharp or subtile than the vulgar in that manner; because men in those times wanted both variety of examples and subtilty of conceit: and as hieroglyphics were before letters, so parables were before arguments: and nevertheless now and at all times they do retain much life and vigour, because reason cannot be so sensible, nor examples so fit.

But there remaineth yet another use of Poesy Parabolical, opposite to that which we last mentioned: for that tendeth to demonstrate and illustrate that which is taught or delivered, and this other to retire and obscure it: that is when the secrets and mysteries of religion, policy, or philosophy are involved in fables or parables. Of this in divine poesy we see the use is authorized. In heathen poesy we see the exposition of fables doth fall out sometimes with great felicity; as in the

[1] The last clause of this sentence is omitted in the translation.

[2] This obscure sentence is explained in the translation to mean that Parabolic Poesy is *historia cum typo, quæ intellectualia deducit ad sensum*,—typical history, by which ideas that are objects of the Intellect are represented in forms that are objects of the Sense.

fable that the giants being overthrown in their war against the gods, the Earth their mother in revenge thereof brought forth Fame:

> Illam Terra parens, irâ irritata deorum,
> Extremam, ut perhibent, Cœo Enceladoque sororem
> Progenuit:

expounded that when princes and monarchs have suppressed actual and open rebels, then the malignity of people (which is the mother of rebellion) doth bring forth libels and slanders and taxations of the state, which is of the same kind with rebellion, but more feminine. So in the fable that the rest of the gods having conspired to bind Jupiter, Pallas called Briareus with his hundred hands to his aid: expounded that monarchies need not fear any curbing of their absoluteness by mighty subjects, as long as by wisdom they keep the hearts of the people, who will be sure to come in on their side. So in the fable that Achilles was brought up under Chiron the Centaur, who was part a man and part a beast: expounded ingeniously but corruptly by Machiavel, that it belongeth to the education and discipline of princes to know as well how to play the part of the lion in violence and the fox in guile, as of the man in virtue and justice.[1] Nevertheless in many the like encounters, I do rather think that the fable was first, and the exposition devised, than that the moral was first, and thereupon the fable framed. For I find it was an ancient vanity in Chrysippus, that troubled himself with great contention to fasten the assertions of the Stoics upon the fictions of the ancient poets. But yet that all the fables and fictions of the poets were but pleasure and not figure, I interpose no opinion. Surely of those poets which are now extant, even Homer himself, (notwithstanding he was made a kind of Scripture by the later schools of the Grecians,) yet I should without any difficulty pronounce that his fables had no such inwardness in his own meaning; but what they might have upon a more original tradition, is not easy to affirm; for he was not the inventor of many of them.[2]

[1] The Prince, c. 18. As two of the animals are the same it is possible that Macchiavelli was thinking of what was said of Boniface VIII. by the predecessor whom he forced to abdicate,— that he came in like a fox, would reign like a lion, and die like a dog.—*R. L. E.*

[2] For these examples there is substituted in the translation a full exposition of the three fables of Pan, Perseus, and Dionysus. And it is worth observing that, upon the question whether there was really a mystic sense at the bottom of the ancient fables, Bacon expresses in the translation a more decided inclination to the affirmative than he does here.

In this third part of learning, which is poesy, I can report no deficience. For being as a plant that cometh of the lust of the earth, without a formal seed, it hath sprung up and spread abroad more than any other kind. But to ascribe unto it that which is due; for the expressing of affections, passions, corruptions, and customs, we are beholding to poets more than to the philosophers' works; and for wit and eloquence not much less than to orators' harangues.[1] But it is not good to stay too long in the theatre. Let us now pass on to the judicial place or palace of the mind, which we are to approach and view with more reverence and attention.

¶ [2] The knowledge of man is as the waters, some descending from above, and some springing from beneath; the one informed by the light of nature, the other inspired by divine revelation. The light of nature consisteth in the notions of the mind and the reports of the senses; for as for knowledge which man receiveth by teaching, it is cumulative and not original; as in a water that besides his own spring-head is fed with other springs and streams. So then according to these two differing illuminations or originals, knowledge is first of all divided into Divinity and Philosophy.

In Philosophy, the contemplations of man do either penetrate unto God, or are circumferred to Nature, or are reflected or reverted upon Himself. Out of which several inquiries there do arise three knowledges, Divine philosophy, Natural philosophy, and Human philosophy or Humanity. For all things are marked and stamped with this triple character, of the power of God, the difference of nature, and the use of man. But because the distributions and partitions of knowledge are not like several lines that meet in one angle, and so touch but in a point; but are like branches of a tree that meet in a stem, which hath a dimension and quantity of entireness and continuance, before it come to discontinue and break itself into arms and boughs; therefore it is good, before we enter into the former distribution, to erect and constitute one universal science, by the name of *Philosophia Prima*, Primitive or Summary Philosophy, as the main and common way, before we come where the ways part and divide themselves; which

[1] This sentence is omitted in the translation.

[2] De Aug. iii. 1. The order of this chapter is changed in the translation, and a good deal added.

science whether I should report as deficient or no, I stand doubtful. For I find a certain rhapsody of Natural Theology, and of divers parts of Logic; and of that part of Natural Philosophy which concerneth the Principles, and of that other part of Natural Philosophy which concerneth the Soul or Spirit; all these strangely commixed and confused; but being examined, it seemeth to me rather a depredation of other sciences, advanced and exalted unto some height of terms[1], than any thing solid or substantive of itself. Nevertheless I cannot be ignorant of the distinction which is current, that the same things are handled but in several respects; as for example, that logic considereth of many things as they are in notion, and this philosophy as they are in nature; the one in appearance, the other in existence. But I find this difference better made than pursued. For if they had considered Quantity, Similitude, Diversity, and the rest of those Extern Characters of things, as philosophers, and in nature, their inquiries must of force have been of a far other kind than they are. For doth any of them, in handling Quantity, speak of the force of union, how and how far it multiplieth virtue? Doth any give the reason, why some things in nature are so common and in so great mass, and others so rare and in so small quantity? Doth any, in handling Similitude and Diversity, assign the cause why iron should not move to iron, which is more like, but move to the loadstone, which is less like? Why in all diversities of things there should be certain participles in nature, which are almost ambiguous to which kind they should be referred? But there is a mere and deep silence touching the nature and operation of those Common Adjuncts of things, as in nature; and only a resuming and repeating of the force and use of them in speech or argument. Therefore, because in a writing of this nature I avoid all subtility, my meaning touching this original or universal philosophy is thus, in a plain and gross description by negative: *That it be a receptacle for all such profitable observations and axioms as fall not within the compass of any of the special parts of philosophy or sciences, but are more common and of a higher stage.*

Now that there are many of that kind need not be doubted.

[1] *Et sublimitate quadam sermonis hominum qui se ipsos admirari amant tanquam in vertice scientiarum collocatam.*—De Aug. The substance of the rest of this paragraph, till we come to the last sentence, is transferred to the end of the chapter in the *De Augmentis* and set forth more fully and clearly.

For example; is not the rule, *Si inæqualibus æqualia addas, omnia erunt inæqualia,* [if equals be added to unequals, the wholes will be unequal,] an axiom as well of justice as of the mathematics?[1] And is there not a true coincidence between commutative and distributive justice, and arithmetical and geometrical proportion? Is not that other rule, *Quæ in eodem tertio conveniunt, et inter se conveniunt,* [things that are equal to the same are equal to each other,] a rule taken from the mathematics, but so potent in logic as all syllogisms are built upon it? Is not the observation, *Omnia mutantur, nil interit,* [all things change, but nothing is lost,] a contemplation in philosophy thus, That the *quantum* of nature is eternal? in natural theology thus, That it requireth the same omnipotence to make somewhat nothing, which at the first made nothing somewhat? according to the scripture, *Didici quod omnia opera quæ fecit Deus perseverent in perpetuum; non possumus eis quicquam addere nec auferre:* [I know that whatsoever God doeth, it shall be for ever; nothing can be put to it, nor anything taken from it]. Is not the ground, which Machiavel wisely and largely discourseth concerning governments, that the way to establish and preserve them is to reduce them *ad principia*[2], a rule in religion and nature[3] as well as in civil administration? Was not the Persian Magic a reduction or correspondence of the principles and architectures of nature to the rules and policy of governments? Is not the precept of a musician, to fall from a discord or harsh accord upon a concord or sweet accord, alike true in affection? Is not the trope of music, to avoid or slide from the close or cadence, common

[1] This clause is printed out of its place both in the original and in the editions of 1629 and 1633; being inserted after the next sentence. It is obviously an error of the printer; but worth noticing as evidence of the imperfection of the arrangements then made for correcting the press. I am inclined to think that in Bacon's time the proof-sheets were never revised by the author.

In the translation we are told that the axiom holds with regard to *distributive* justice only. (*Eadem in Ethicis obtinet quatenus ad justitiam distributivam: siquidem in justitiâ commutativa, ut paria imparibus tribuantur ratio æquitatis postulat; at in distributiva, nisi imparia imparibus præstentur, iniquitas fuerit maxima.*) Equal measure distributed to unequal conditions produces an unequal result; a truth of which many striking illustrations are furnished by the operation of our own laws as between the rich and the poor, when the same penalty inflicted for the same offence falls heavily on the one and lightly on the other. In matter of *commutation*,—as in a question, for instance, of compensation for property destroyed, — this of course does not hold. The coincidence between commutative and distributive justice and arithmetical and geometrical proportion is not alluded to in the translation. But this may have been by accident; the translator perhaps not having observed where the misplaced sentence was meant to come in.

[2] Discorsi, iii. 1.

[3] The translation says *in physicis*, omitting the word *religion*.

with the trope of rhetoric of deceiving expectation? Is not the delight of the quavering upon a stop in music the same with [1] the playing of light upon the water?

Splendet tremulo sub lumine pontus:
[Beneath the trembling light glitters the sea.]

Are not the organs of the senses of one kind with the organs of reflexion, the eye with a glass, the ear with a cave or strait determined and bounded? [2] Neither are these only similitudes, as men of narrow observation may conceive them to be, but the same footsteps of nature, treading or printing upon several subjects or matters. This science therefore (as I understand it) I may justly report as deficient; for I see sometimes the profounder sort of wits, in handling some particular argument, will now and then draw a bucket of water out of this well for their present use; but the springhead thereof seemeth to me not to have been visited, being of so excellent use both for the disclosing of nature and the abridgment of art.

Philosophia Prima, sive de Fontibus Scientiarum.

¶ [3] This science being therefore first placed as a common parent, like unto Berecynthia, which had so much heavenly issue,

Omnes cœlicolas, omnes supera alta tenentes:
[All dwellers in the heaven and upper sky:]

we may return to the former distribution of the three philosophies; Divine, Natural, and Human. And as concerning Divine Philosophy or Natural Theology, it is that knowledge or rudiment of knowledge concerning God which may be obtained by the contemplation of his creatures; which knowledge may be truly termed divine in respect of the object, and natural in respect of the light. The bounds of this knowledge are, that it sufficeth to convince atheism, but not to inform religion: and therefore there was never miracle wrought by God to convert an atheist, because the light of nature might have led him to confess a God: but miracles have been wrought to convert idolaters and the superstitious, because no light of nature extendeth to declare the will and true worship of God. For as all works do shew forth the power and skill of the workman, and not his image; so it is of the works of God;

[1] So ed. 1633. The original and the ed. 1629 have *which*.
[2] Some other instances are added in the translation.
[3] De Aug. iii. 2.

which do shew the omnipotency and wisdom of the maker, but not his image: and therefore therein the heathen opinion differeth from the sacred truth; for they supposed the world to be the image of God, and man to be an extract or compendious image of the world; but the Scriptures never vouchsafe to attribute to the world that honour, as to be the image of God, but only *the work of his hands;* neither do they speak of any other image of God, but man. Wherefore by the contemplation of nature to induce and inforce the acknowledgement of God, and to demonstrate his power, providence, and goodness, is an excellent argument, and hath been excellently handled by divers. But on the other side, out of the contemplation of nature, or ground of human knowledges, to induce any verity or persuasion concerning the points of faith, is in my judgment not safe: *Da fidei quæ fidei sunt:* [give unto Faith that which is Faith's]. For the Heathen themselves conclude as much in that excellent and divine fable of the golden chain: *That men and gods were not able to draw Jupiter down to the earth; but contrariwise, Jupiter was able to draw them up to heaven.* So as we ought not to attempt to draw down or submit the mysteries of God to our reason; but contrariwise to raise and advance our reason to the divine truth. So as in this part of knowledge touching divine philosophy, I am so far from noting any deficience, as I rather note an excess: whereunto I have digressed, because of the extreme prejudice which both religion and philosophy hath received and may receive by being commixed together; as that which undoubtedly will make an heretical religion, and an imaginary and fabulous philosophy.

Otherwise it is of the nature of angels and spirits, which is an appendix of theology both divine and natural, and is neither inscrutable nor interdicted; for although the Scripture saith, *Let no man deceive you in sublime discourse touching the worship of angels, pressing into that he knoweth not,* &c. yet notwithstanding if you observe well that precept, it may appear thereby that there be two things only forbidden, adoration of them, and opinion fantastical of them; either to extol them further than appertaineth to the degree of a creature, or to extol a man's knowledge of them further than he hath ground. But the sober and grounded inquiry which may arise out of the passages of holy Scriptures, or out of the gradations of nature, is not restrained. So of degenerate and revolted spirits,

the conversing with them or the employment of them is prohibited, much more any veneration towards them. But the contemplation or science of their nature, their power, their illusions, either by Scripture or reason, is a part of spiritual wisdom. For so the apostle saith, *We are not ignorant of his stratagems;* and it is no more unlawful to inquire the nature of evil spirits than to enquire the force of poisons in nature, or the nature of sin and vice in morality. But this part touching angels and spirits, I cannot note as deficient, for many have occupied themselves in it; I may rather challenge it, in many of the writers thereof, as fabulous and fantastical.

¶ [1] Leaving therefore Divine Philosophy or Natural Theology (not Divinity or Inspired Theology, which we reserve for the last of all, as the haven and sabbath of all man's contemplations), we will now proceed to Natural Philosophy. If then it be true that Democritus said, *That the truth of nature lieth hid in certain deep mines and caves;* and if it be true likewise that the Alchemists do so much inculcate, that Vulcan is a second nature, and imitateth that dexterously and compendiously which nature worketh by ambages and length of time; it were good to divide natural philosophy into the mine and the furnace, and to make two professions or occupations of natural philosophers, some to be pioners and some smiths; some to dig, and some to refine and hammer. And surely I do best allow of a division of that kind, though in more familiar and scholastical terms; namely, that these be the two parts of natural philosophy, — the Inquisition of Causes, and the Production of Effects; Speculative, and Operative; Natural Science, and Natural Prudence. For as in civil matters there is a wisdom of discourse and a wisdom of direction; so is it in natural. And here I will make a request, that for the latter (or at least for a part thereof) I may revive and reintegrate the misapplied and abused name of Natural Magic; which in the true sense is but Natural Wisdom, or Natural Prudence; taken according to the ancient acception, purged from vanity and superstition.[2] Now although it be true, and I know it well, that there is an intercourse between Causes and Effects, so as both these knowledges, Speculative and Operative, have a great connexion between themselves; yet because all true and fruitful Natural Philosophy hath a double scale or ladder, ascendent and de-

[1] De Aug. iii. 3.

[2] This request is omitted in the translation.

scendent; ascending from experiments to the invention of causes, and descending from causes to the invention of new experiments; therefore I judge it most requisite that these two parts be severally considered and handled.

¶ [1] Natural Science or Theory is divided into Physic and Metaphysic: wherein I desire it may be conceived that I use the word Metaphysic in a differing sense from that that is received: and in like manner I doubt not but it will easily appear to men of judgment that in this and other particulars, wheresoever my conception and notion may differ from the ancient, yet I am studious to keep the ancient terms. For hoping well to deliver myself from mistaking by the order and perspicuous expressing of that I do propound, I am otherwise zealous and affectionate to recede as little from antiquity, either in terms or opinions, as may stand with truth and the proficience of knowledge. And herein I cannot a little marvel at the philosopher Aristotle, that did proceed in such a spirit of difference and contradiction towards all antiquity; undertaking not only to frame new words of science at pleasure, but to confound and extinguish all ancient wisdom; insomuch as he never nameth or mentioneth an ancient author or opinion, but to confute and reprove; wherein for glory, and drawing followers and disciples, he took the right course. For certainly there cometh to pass and hath place in human truth, that which was noted and pronounced in the highest truth: *Veni in nomine Patris, nec recipitis me; si quis venerit in nomine suo, eum recipietis;* [I have come in my Father's name, and ye receive me not; if one come in his own name, him ye will receive]. But in this divine aphorism (considering to whom it was applied, namely to Antichrist, the highest deceiver,) we may discern well that *the coming in a man's own name,* without regard of antiquity or paternity, is no good sign of truth; although it be joined with the fortune and success of an *Eum recipietis.* But for this excellent person [2] Aristotle, I will think of him that he learned that humour of his scholar, with whom it seemeth he did emulate, the one to conquer all opinions, as the other to conquer all nations. Wherein nevertheless, it may be, he may at some men's hands that are of a bitter disposition get a like title as his scholar did;

[1] De Aug. iii. 4.

[2] *viro tam eximio certe, et ob acumen ingenii mirabili.* — De Aug.

Felix terrarum prædo, non utile mundo
Editus exemplum, &c.

[a fortunate robber, who made prize of nations]; so

Felix doctrinæ prædo,

[a fortunate robber, who made prize of learning]. But to me on the other side that do desire, as much as lieth in my pen, to ground a sociable intercourse[1] between antiquity and proficience, it seemeth best to keep way with antiquity *usque ad aras*, [as far as may be without violating higher obligations;] and therefore to retain the ancient terms, though I sometimes alter the uses and definitions; according to the moderate proceeding in civil government, where although there be some alteration, yet that holdeth which Tacitus wisely noteth, *eadem magistratuum vocabula*, [the name of the magistracies are not changed].

To return therefore to the use and acception of the term Metaphysic, as I do now understand the word: It appeareth by that which hath been already said, that I intend Philosophia Prima, Summary Philosophy, and Metaphysic, which heretofore have been confounded as one, to be two distinct things. For the one I have made as a parent or common ancestor to all knowledge, and the other I have now brought in as a branch or descendent of Natural Science. It appeareth likewise that I have assigned to Summary Philosophy the common principles and axioms which are promiscuous and indifferent to several sciences. I have assigned unto it likewise the inquiry *touching the operation of the relative and adventive characters of essences, as Quantity, Similitude, Diversity, Possibility*, and the rest; with this distinction and provision; that they be handled as they have efficacy in nature, and not logically. It appeareth likewise that Natural Theology, which heretofore hath been handled confusedly with Metaphysic, I have inclosed and bounded by itself. It is therefore now a question, what is left remaining for Metaphysic; wherein I may without prejudice preserve thus much of the conceit of antiquity, that Physic should contemplate that which is inherent in matter and therefore transitory, and Metaphysic that which is abstracted and fixed. And again that Physic should handle that which supposeth in nature only a being and moving[2], and Metaphysic

[1] *entercourse* in the original,— the form of the word commonly used by Bacon.
[2] The translation adds "and natural necessity."

should handle that which supposeth further in nature a reason, understanding, and platform.[1] But the difference, perspicuously expressed, is most familiar and sensible. For as we divided Natural Philosophy in general into the Inquiry of Causes and Productions of Effects; so that part which concerneth the Inquiry of Causes we do subdivide, according to the received and sound division of Causes; the one part, which is Physic, enquireth and handleth the Material and Efficient Causes; and the other, which is Metaphysic, handleth the Formal and Final Causes.

Physic (taking it according to the derivation, and not according to our idiom for Medicine,) is situate in a middle term or distance between Natural History and Metaphysic. For Natural History describeth the *variety of things;* Physic, the causes, but *variable or respective causes;* and Metaphysic, the *fixed and constant causes.*

> Limus ut hic durescit, et hæc ut cera liquescit,
> Uno eodemque igni:
> [As the same fire which makes the soft clay hard
> Makes hard wax soft:]

Fire is the cause of induration, but respective to clay; fire is the cause of colliquation, but respective to wax; but fire is no constant cause either of induration or colliquation. So then the physical causes are but the efficient and the matter. Physic hath three parts; whereof two respect nature *united* or *collected,* the third contemplateth nature *diffused* or *distributed.* Nature is collected either into one entire *total,* or else into the same *principles* or *seeds.* So as the first doctrine is touching the Contexture or Configuration of things, as *de mundo, de universitate rerum.* The second is the doctrine concerning the Principles or Originals of things. The third is the doctrine concerning all Variety and Particularity of things, whether it be of the differing substances, or their differing qualities and natures; whereof there needeth no enumeration, this part being but as a gloss or paraphrase, that attendeth upon the text of Natural History.[2] Of these three I cannot report any as deficient. In what truth or perfection they are handled, I make not now any judgment: but they are parts of knowledge not deserted by the labour of man.

[1] *ideam.*

[2] On this branch of the subject there is a large addition of ten or twelve pages in the *De Augmentis.*

For Metaphysic, we have assigned unto it the inquiry of Formal and Final Causes; which assignation, as to the former of them, may seem to be nugatory and void, because of the received and inveterate opinion that the inquisition of man is not competent to find out *essential forms* or *true differences:* of which opinion we will take this hold; that the invention of Forms is of all other parts of knowledge the worthiest to be sought, if it be possible to be found. As for the possibility, they are ill discoverers that think there is no land when they can see nothing but sea. But it is manifest that Plato in his opinion of Ideas, as one that had a wit of elevation situate as upon a cliff, did descry *that forms were the true object of knowledge;* but lost the real fruit of his opinion, by considering of forms as absolutely abstracted from matter, and not confined and determined by matter; and so turning his opinion upon Theology, wherewith all his natural philosophy is infected. But if any man shall keep a continual watchful and severe eye upon action, operation, and the use of knowledge, he may advise and take notice what are the Forms, the disclosures whereof are fruitful and important to the state of man. For as to the Forms of substances—Man only except, of whom it is said, *Formavit hominem de limo terræ, et spiravit in faciem ejus spiraculum vitæ,* [He formed man of the dust of the ground, and breathed into his nostrils the breath of life,] and not as of all other creatures, *Producant aquæ, producat terra,* [let the waters bring forth, let the earth bring forth,] — the Forms of Substances I say (as they are now by compounding and transplanting multiplied) are so perplexed, as they are not to be enquired [1]; no more than it were either possible or to purpose to seek in gross *the forms of those sounds which make words,* which by composition and transposition of letters are infinite. But on the other side, to enquire *the form of those sounds or voices which make simple letters* is easily comprehensible, and being known, induceth and manifesteth the forms of all words, which consist and are compounded of them. In the same manner to enquire the Form of a lion, of an oak, of gold, nay of water, of air, is a vain pursuit: but to enquire the Forms of sense, of voluntary motion, of vegetation, of colours, of gravity and levity, of density, of tenuity, of heat, of cold, and all other

[1] Or at least (adds the translation) the enquiry must be put off till forms of simpler nature have been discovered.

natures and qualities, which like an alphabet are not many, and of which the essences (upheld by matter) of all creatures do consist; to enquire I say the *true forms* of these, is that part of Metaphysic which we now define of. Not but that Physic doth make inquiry and take consideration of the same natures: but how? Only as to the Material and Efficient Causes of them, and not as to the Forms. For example; if the cause of Whiteness in snow or froth be enquired, and it be rendered thus, *that the subtile intermixture of air and water is the cause,* it is well rendered; but nevertheless, is this the Form of Whiteness? No; but it is the Efficient, which is ever but *vehiculum formæ,* [the carrier of the Form].[1] This part of Metaphysic I do not find laboured and performed; whereat I marvel not, because I hold it not possible to be invented by that course of invention which hath been used; in regard that men (which is the root of all error) have made too untimely a departure and too remote a recess from particulars.

Metaphysica, sive De Formis et Finibus Rerum.

But the use of this part of Metaphysic which I report as deficient, is of the rest the most excellent in two respects; the one, because it is the duty and virtue of all knowledge to abridge the infinity of individual experience as much as the conception of truth will permit, and to remedy the complaint of *vita brevis, ars longa,* [life is short and art is long;] which is performed by uniting the notions and conceptions of sciences.[2] For knowledges are as pyramides, whereof history is the basis: so of Natural Philosophy the basis is Natural History; the stage next the basis is Physic; the stage next the vertical point is Metaphysic. As for the vertical point, *Opus quod operatur Deus à principio usque ad finem,* [the work which God worketh from the beginning to the end,] the Summary Law of Nature, we know not whether man's inquiry can attain unto it. But these three be the true *stages* of knowledge; and are to them that are depraved no better than the giants' hills, [Pelion, Ossa, and Olympus, piled upon each other,]

> Ter sunt conati imponere Pelio Ossam,
> Scilicet atque Ossæ frondosum involvere Olympum:

[1] A sentence is added here in the translation; see note on *Valerius Terminus*, c. 11.

[2] *i. e.* collecting them into axioms more general, applicable to all the individual varieties: (*axiomata scientiarum in magis generalia, et quæ omni materiæ rerum individuarum competant, colligendo et uniendo*).

but to those which refer all things to the glory of God, they are as the three acclamations, *Sancte, sancte, sancte;* holy in the description or dilatation of his works, holy in the connexion or concatenation of them, and holy in the union of them in a perpetual and uniform law. And therefore the speculation was excellent in Parmenides and Plato, although but a speculation in them, That all things by scale did ascend to unity. So then always that knowledge is worthiest, which is charged with least multiplicity; which appeareth to be Metaphysic; as that which considereth the Simple Forms or Differences of things, which are few in number, and the degrees and co-ordinations whereof make all this variety. The second respect which valueth and commendeth this part of Metaphysic, is that it doth enfranchise the power of man unto the greatest liberty and possibility of works and effects. For Physic carrieth men in narrow and restrained ways, subject to many accidents of impediments, imitating the ordinary flexuous courses of nature; but *latæ undique sunt sapientibus viæ:* to sapience (which was anciently defined to be *rerum divinarum et humanarum scientia,* [the knowledge of things human and divine],) there is ever choice of means. For physical causes give light to new invention *in simili materia;* but whosoever knoweth any *form,* knoweth the utmost possibility of *superinducing that nature upon any variety of matter,* and so is less restrained in operation, either to the basis of the Matter, or the condition of the Efficient: which kind of knowledge Salomon likewise, though in a more divine sense, elegantly describeth: *Non arctabuntur gressus tui, et currens non habebis offendiculum;* [thy steps shall not be straitened; thou shalt run and not stumble]. The ways of sapience are not much liable either to particularity or chance.[1]

The second part of Metaphysic is the inquiry of *final* causes, which I am moved to report not as omitted, but as misplaced.[2] And yet if it were but a fault in order, I would not speak of it; for order is matter of illustration, but pertaineth not to the substance of sciences: but this misplacing hath caused a deficience, or at least a great improficience in the sciences themselves. For the handling of final causes mixed with the rest

[1] *i. e.* neither confined to particular methods, nor liable to be defeated by accidental obstructions. (*Nec angustiis nec obicibus obnoxias esse.*)

[2] *i. e.* placed in the department of Physic instead of Metaphysic. (*Solent enim inquiri inter Physica, non inter Metaphysica.*)

in physical inquiries, hath intercepted the severe and diligent inquiry of all real and physical causes, and given men the occasion to stay upon these satisfactory and specious causes, to the great arrest and prejudice of further discovery. For this I find done not only by Plato, who ever anchoreth upon that shore, but by Aristotle, Galen, and others, which do usually likewise fall upon these flats of *discoursing causes.* For to say that *the hairs of the eye-lids are for a quickset and fence about the sight;* or that *the firmness of the skins and hides of living creatures is to defend them from the extremities of heat or cold;* or that *the bones are for the columns or beams, whereupon the frames of the bodies of living creatures are built;* or that *the leaves of trees are for protecting of the fruit;* or that *the clouds are for watering of the earth;* or that *the solidness of the earth is for the station and mansion of living creatures,* and the like, is well enquired and collected in Metaphysic; but in Physic they are impertinent. Nay, they are indeed but remoras and hinderances to stay and slug the ship from further sailing, and have brought this to pass, that the search of the Physical Causes hath been neglected and passed in silence. And therefore the natural philosophy of Democritus and some others, who did not suppose a mind or reason in the frame of things, but attributed *the form thereof able to maintain itself to infinite essays or proofs of nature,* which they term *fortune,* seemeth to me (as far as I can judge by the recital and fragments which remain unto us) in particularities of physical causes more real and better enquired than that of Aristotle and Plato; whereof both intermingled final causes, the one as a part of theology, and the other as a part of logic, which were the favourite studies respectively of both those persons. Not because those final causes are not true, and worthy to be enquired, being kept within their own province; but because their excursions into the limits of physical causes hath bred a vastness and solitude in that track. For otherwise keeping their precincts and borders, men are extremely deceived if they think there is an enmity or repugnancy at all between them. For the cause rendered, that *the hairs about the eye-lids are for the safeguard of the sight,* doth not impugn the cause rendered, that *pilosity is incident to orifices of moisture; Muscosi fontes,* [the mossy springs,] &c. Nor the cause rendered, that *the firmness of hides is for the armour of the body against extremities of heat or*

cold, doth not impugn the cause rendered, that *contraction of pores is incident to the outwardest parts, in regard of their adjacence to foreign or unlike bodies;* and so of the rest: both causes being true and compatible, the one declaring an intention, the other a consequence only. Neither doth this call in question or derogate from divine providence, but highly confirm and exalt it. For as in civil actions he is the greater and deeper politique, that can make other men the instruments of his will and ends and yet never acquaint them with his purpose, so as they shall do it and yet not know what they do, than he that imparteth his meaning to those he employeth; so is the wisdom of God more admirable, when nature intendeth one thing and providence draweth forth another, than if he had communicated to particular creatures and motions the characters and impressions of his providence. And thus much for Metaphysic; the later part whereof I allow as extant, but wish it confined to its proper place.

¶ [1] Nevertheless there remaineth yet another part of Natural Philosophy, which is commonly made a principal part, and holdeth rank with Physic special and Metaphysic; which is Mathematic; but I think it more agreeable to the nature of things and to the light of order to place it as a branch of Metaphysic; for the subject of it being Quantity; not Quantity indefinite, which is but a relative and belongeth to *philosophia prima* (as hath been said,) but Quantity determined or proportionable; it appeareth to be one of the Essential Forms of things; as that that is causative in nature of a number of effects; insomuch as we see in the schools both of Democritus and of Pythagoras, that the one *did ascribe figure to the first seeds of things*, and the other *did suppose numbers to be the principles and originals of things:* and it is true also that of all other forms (as we understand forms) it is the most abstracted and separable from matter, and therefore most proper to Metaphysic; which hath likewise been the cause why it hath been better laboured and enquired than any of the other forms, which are more immersed into matter. For it being the nature of the mind of man (to the extreme prejudice of knowledge) to delight in the spacious liberty of generalities, as in a champion region, and not in the inclosures of particularity; the

[1] De Aug. iii. 6. Observe that in translating this part of the work Bacon has not only made great additions, but changed the order.

Mathematics of all other knowledge were the goodliest fields to satisfy that appetite. But for the placing of this science, it is not much material[1]: only we have endeavoured in these our partitions to observe a kind of perspective, that one part may cast light upon another.

The Mathematics are either Pure or Mixed. To the Pure Mathematics are those sciences belonging which handle Quantity Determinate, merely severed from any axioms of natural philosophy; and these are two, Geometry and Arithmetic; the one handling Quantity continued, and the other dissevered. Mixed hath for subject some axioms or parts of natural philosophy, and considereth Quantity determined, as it is auxiliary and incident unto them. For many parts of nature can neither be invented with sufficient subtilty nor demonstrated with sufficient perspicuity nor accommodated unto use with sufficient dexterity, without the aid and intervening of the Mathematics: of which sort are Perspective, Music, Astronomy, Cosmography, Architecture, Enginery, and divers others. In the Mathematics I can report no deficience, except it be that men do not sufficiently understand the excellent use of the Pure Mathematics, in that they do remedy and cure many defects in the wit and faculties intellectual. For if the wit be too dull, they sharpen it; if too wandering, they fix it; if too inherent in the sense, they abstract it. So that as tennis is a game of no use in itself, but of great use in respect it maketh a quick eye and a body ready to put itself into all postures; so in the Mathematics, that use which is collateral and intervenient is no less worthy than that which is principal and intended.[2]

[1] In the *De Augmentis* he concludes by placing it as an appendix and auxiliary to Natural Philosophy, in order to mark more distinctly its proper function; which he complains that the mathematicians are apt to forget, and to exalt it, as the logicians exalt logic, above the sciences which it is its business to serve.

[2] The whole of this passage relating to the use of pure mathematics in the training of the intellect is omitted in the translation; and the omission has been represented as indicating a change in Bacon's opinion either as to the value of this particular study in that respect, or as to the expediency of encouraging *any* study which is "useful only to the mind" of the student. This conjecture is hardly reconcilable however with the fact that the same recommendation of mathematics as a cure for certain defects of the intellect is repeated both in a later chapter of the *De Augmentis* (vi. 4.; to which place indeed the observation properly belongs), and in the *Essay on Studies* as published in 1625. Nor is there any difficulty in accounting for the omission of it here. When Bacon wrote the *Advancement* in 1605, he had no deficiency to report in the department of Mathematics: he could not name any branch of the study which had not been properly pursued, and merely took the opportunity of observing by the way that the study of the pure mathematics had a collateral and incidental value as an instrument of education: an observation very good and just in itself, but not at all to the purpose of the argument. When he revised the work in

And as for the Mixed Mathematics, I may only make this prediction, that there cannot fail to be more kinds of them, as nature grows further disclosed. Thus much of Natural Science, or the part of nature Speculative.

¶ [1] For Natural Prudence, or the part Operative of Natural Philosophy, we will divide it into three parts, Experimental, Philosophical, and Magical[2]; which three parts active have a correspondence and analogy with the three parts Speculative, Natural History, Physic, and Metaphysic. For many operations have been invented, sometimes by a casual incidence and occurrence, sometimes by a purposed experiment; and of those which have been found by an intentional experiment, some have been found out by varying or extending the same experiment, some by transferring and compounding divers experiments the one into the other, which kind of invention an empiric may manage.[3] Again, by the knowledge of physical causes there cannot fail to follow many indications and designations of new particulars, if men in their speculation will keep one eye upon use and practice. But these are but coastings along the shore, *premendo littus iniquum:* for it seemeth to me there can hardly be discovered any radical or fundamental alterations and innovations in nature, either by the fortune and essays of experiments, or by the light and direction of physical causes. If therefore we have reported Metaphysic deficient, it must follow that we do the like of Natural Magic, which hath relation thereunto. For as for the Natural Magic whereof now there is mention in books, containing certain credulous and superstitious conceits and observations of Sympathies and Antipathies and hidden proprieties, and some frivolous experiments, strange rather by disguisement than in themselves; it is as far differing in truth of nature from such a knowledge as we require, as the story of king Arthur of Britain, or Hugh of

Naturalis Magia, sive Physica Operativa Major.

1622 he knew more about mathematics, and was able to point out certain deficiencies which were very much to the purpose, — especially as to the doctrine of Solids in Geometry and of Series in Arithmetic; and in introducing a relevant observation he naturally struck out the irrelevant one.

[1] DeAug. iii. 5.

[2] In the translation the name *Natural Prudence* is omitted; the *part operative* is divided into two parts, instead of three; viz. Mechanic and Magic; and the whole exposition is much altered and enlarged.

[3] Being a matter of ingenuity and sagacity, rather than philosophy (*quæ magis ingeniosa res est et sagax, quam philosophica*). This is in fact the *Experientia Literata* of which we hear more further on.

Bourdeaux, differs from Cæsar's commentaries in truth of story. For it is manifest that Cæsar did greater things *de vero* than those imaginary heroes were feigned to do. But he did them not in that fabulous manner. Of this kind of learning the fable of Ixion was a figure, who designed to enjoy Juno, the goddess of power; and instead of her had copulation with a cloud, of which mixture were begotten centaurs and chimeras. So whosoever shall entertain high and vaporous imaginations instead of a laborious and sober inquiry of truth, shall beget hopes and beliefs of strange and impossible shapes. And therefore we may note in these sciences which hold so much of imagination and belief, as this degenerate Natural Magic, Alchemy, Astrology, and the like, that in their propositions the description of the means is ever more monstrous than the pretence or end. For it is a thing more probable, that he that knoweth well the natures of Weight, of Colour, of Pliant and Fragile in respect of the hammer, of Volatile and Fixed in respect of the fire, and the rest, may superinduce upon some metal the nature and form of gold by such mechanique as belongeth to the production of the natures afore rehearsed, than that some grains of the medicine projected should in a few moments of time turn a sea of quicksilver or other material into gold. So it is more probable, that he that knoweth the nature of arefaction, the nature of assimilation of nourishment to the thing nourished, the manner of increase and clearing of spirits, the manner of the depredations which spirits make upon the humours and solid parts, shall by ambages of diets, bathings, anointings, medicines, motions, and the like, prolong life or restore some degree of youth or vivacity, than that it can be done with the use of a few drops or scruples of a liquor or receit. To conclude therefore, the true Natural Magic, which is that great liberty and latitude of operation which dependeth upon the knowledge of Forms, I may report deficient, as the relative thereof is. To which part, if we be serious and incline not to vanities and plausible discourse, besides the deriving and deducing the operations themselves from Metaphysic, there are pertinent two points of much purpose, the one by way of preparation, the other by way of caution. The first is, that there be made a *Calendar resembling an inventory*.[1] of the

[1] This is the Inventary which (as I think) was to be contained in the tenth chapter of the *Valerius Terminus*. See my note on Mr. Ellis's preface.

estate of man, containing all the inventions (being the works or fruits of nature or art) which are now extant and whereof man is already possessed; out of which doth naturally result a note, what things are yet held impossible, or not invented; which calendar will be the more artificial and serviceable, if to every reputed impossibility you add what thing is extant which cometh the nearest in degree to that impossibility; to the end that by these optatives and potentials man's inquiry may be the more awake in deducing direction of works from the speculation of causes. And secondly, that those experiments be not only esteemed which have an immediate and present use, but those principally which are of most universal consequence for invention of other experiments, and those which give most light to the invention of causes; for the invention of the mariner's needle, which giveth the direction, is of no less benefit for navigation than the invention of the sails, which give the motion.[1] *Inventarium Opum humanarum.*

[2]Thus have I passed through Natural Philosophy, and the deficiences thereof; wherein if I have differed from the ancient and received doctrines, and thereby shall move contradiction; for my part, as I affect not to dissent, so I purpose not to contend. If it be truth,

> Non canimus surdis, respondent omnia sylvæ:
> [All as we sing the listening woods reply:]

the voice of nature will consent, whether the voice of man do or no. And as Alexander Borgia was wont to say of the expedition of the French for Naples, that they came with chalk in their hands to mark up their lodgings, and not with weapons to fight; so I like better that entry of truth which cometh peaceably with chalk to mark up those minds which are capable to lodge and harbour it, than that which cometh with pugnacity and contention.

[3]But there remaineth a division of Natural Philosophy according to the *report of the inquiry*, and nothing concerning the

[1] This example is omitted in the translation, to make room for a better (with which Bacon was probably not acquainted in 1605) — the artificial congelation of water; an experiment which he especially valued as giving light as to the secret process of condensation.

[2] The passage corresponding to this paragraph concludes the third book of the *De Augmentis*. That which follows is transferred to the middle of the fourth chapter.

[3] The substance of this paragraph will be found in the middle of the fourth chapter of the third book of the *De Augmentis* (Vol. I. p. 561.).

matter or subject; and that is Positive and Considerative; when the inquiry reporteth either an Assertion or a Doubt. These doubts or *non liquets* are of two sorts, Particular and Total. For the first, we see a good example thereof in Aristotle's Problems, which deserved to have had a better continuance, but so nevertheless as there is one point whereof warning is to be given and taken. The registering of doubts hath two excellent uses: the one, that it saveth philosophy from errors and falsehoods; when that which is not fully appearing is not collected into assertion, whereby error might draw error, but reserved in doubt: the other, that the entry of doubts are as so many suckers or spunges to draw use[1] of knowledge; insomuch as that which if doubts had not preceded a man should never have advised but passed it over without note, by the suggestion and solicitation of doubts is made to be attended and applied. But both these commodities do scarcely countervail an inconvenience which will intrude itself, if it be not debarred; which is, that when a doubt is once received men labour rather how to keep it a doubt still than how to solve it, and accordingly bend their wits.[2] Of this we see the familiar example in lawyers and scholars, both which if they have once admitted a doubt, it goeth ever after authorised for a doubt. But that use of wit and knowledge is to be allowed, which laboureth to make doubtful things certain, and not those which labour to make certain things doubtful. Therefore these *calendars of doubts* I commend as excellent things, so that there be this caution used, that when they be throughly sifted and brought to resolution, they be from thenceforth omitted, decarded, and not continued to cherish and encourage men in doubting. To which calendar of doubts or problems, I advise be annexed another calendar, as much or more material, which is *a calendar of popular errors:* I mean chiefly, in natural history[3] such as pass in speech and conceit, and are nevertheless apparently detected and convicted of untruth; that man's knowledge be not weakened nor imbased by such dross and vanity. As for the *doubts or non liquets general or in total,* I understand those differences of

Continuatio Problematum in Natura.

Catalogus Falsitatum grassantium in historia Naturæ.

[1] *i. e.* increase. (*quæ incrementa scientiæ perpetuo ad se sugant et alliciant.*)

[2] This is explained in the translation by adding that the recognition of the doubt has the effect of raising champions to maintain each side, and so keeping it up.

[3] *vel in Historia Naturali,* vel in Dogmatibus. — *De Aug.*

opinions touching the principles of nature and the fundamental points of the same, which have caused the diversity of sects, schools, and philosophies; as that of Empedocles, Pythagoras, Democritus, Parmenides, and the rest.[1] For although Aristotle, as though he had been of the race of the Ottomans, thought he could not reign except the first thing he did he killed all his brethren; yet to those that seek truth and not magistrality, it cannot but seem a matter of great profit to see before them the several opinions touching the foundations of nature; not for any exact truth that can be expected in those theories; for as the same phænomena in astronomy are satisfied by the received astronomy of the diurnal motion and the proper motions of the planets with their eccentrics and epicycles, and likewise by the theory of Copernicus who supposed the earth to move; and the calculations are indifferently agreeable to both; so the ordinary face and view of experience is many times satisfied by several theories and philosophies; whereas to find the real truth requireth another manner of severity and attention. For as Aristotle saith that children at the first will call every woman mother, but afterward they come to distinguish according to truth; so experience, if it be in childhood, will call every philosophy mother, but when it cometh to ripeness it will discern the true mother. So as in the mean time it is good to see the several glosses and opinions upon nature, whereof it may be every one in some one point hath seen clearer than his fellows. Therefore I wish some collection to be made painfully and understandingly *de antiquis philosophiis*, out of all the possible light which remaineth to us of them.[2] Which kind of work I find deficient. But here I must give warning, that it be done distinctly and severely[3]; the philosophies of every one throughout by themselves; and not by titles packed and faggoted up together, as hath been done by Plutarch. For it is the harmony of a philosophy in itself which giveth it light and credence; whereas if it be singled and broken, it will seem more foreign and dissonant. For as when I read in Tacitus the

De Antiquis Philosophiis.

[1] In the translation *Empedocles* is omitted; and *Philolaus, Xenophanes, Anaxagoras, Leucippus*, added.

[2] Such (according to the translation) as the Lives of the ancient Philosophers, Plutarch's collection of placita, Plato's quotations, Aristotle's confutations, and the scattered notices in Lactantius, Philo, Philostratus, &c.

[3] So both in the original and in ed. 1633; perhaps a misprint for "severally." Ed. 1629 has *severedly*. The translation has *distinctè* only.

actions of Nero or Claudius, with circumstances of times, inducements, and occasions, I find them not so strange; but when I read them in Suetonius Tranquillus gathered into titles and bundles, and not in order of time, they seem more monstrous and incredible; so is it of any philosophy reported entire, and dismembered by articles. Neither do I exclude opinions of latter times to be likewise represented in this calendar of sects of philosophy, as that of Theophrastus Paracelsus, eloquently reduced into an harmony by the pen of Severinus the Dane; and that of Telesius, and his scholar Donius, being as a pastoral philosophy, full of sense but of no great depth; and that of Fracastorius, who though he pretended not to make any new philosophy, yet did use the absoluteness of his own sense upon the old; and that of Gilbertus our countryman, who revived, with some alterations and demonstrations, the opinions of Xenophanes[1]; and any other worthy to be admitted.

Thus have we now dealt with two of the three beams of man's knowledge; that is *Radius Directus*, which is referred to nature, *Radius Refractus*, which is referred to God, and cannot report truly because of the inequality of the medium. There resteth *Radius Reflexus* whereby Man beholdeth and contemplateth himself.

¶[2] We come therefore now to that knowledge whereunto the ancient oracle directeth us, which is *the knowledge of ourselves;* which deserveth the more accurate handling, by how much it toucheth us more nearly. This knowledge, as it is the end and term of natural philosophy in the intention of man, so notwithstanding it is but a portion of natural philosophy in the continent of nature. And generally let this be a rule, that all partitions of knowledges be accepted rather for lines and veins, than for sections and separations; and that the continuance and

[1] This passage is considerably altered in the translation, and the differences are worth noticing as bearing upon the course of Bacon's reading and the development of his views in the interval. After the notice of Paracelsus the translation proceeds "or of Telesius of Consentium, *who revived the philosophy of Parmenides and so turned the arms of the Peripatetics against themselves*; or of *Patricius the Venetian, who sublimated the fumes of the Platonists;* or of our countryman Gilbert, who set up again the *doctrines of Philolaus.*" The names of *Donius*, *Fracastorius*, and *Xenophanes* are entirely omitted. I do not know whether Mr. Ellis's attention had been directed to these changes.

[2] De Aug. iv. 1. The whole of this chapter is much altered and enlarged; rewritten rather than translated.

entireness of knowledge be preserved. For the contrary hereof hath made particular sciences to become barren, shallow, and erroneous; while they have not been nourished and maintained from the common fountain. So we see Cicero the orator complained of Socrates and his school, that he was the first that separated philosophy and rhetoric; whereupon rhetoric became an empty and verbal art. So we may see that the opinion of Copernicus touching the rotation of the earth [1], which astronomy itself cannot correct because it is not repugnant to any of the phænomena, yet natural philosophy may correct. So we see also that the science of medicine, if it be destituted and forsaken by natural philosophy, it is not much better than an empirical practice. With this reservation therefore we proceed to Human Philosophy or Humanity, which hath two parts: the one considereth man segregate, or distributively; the other congregate, or in society. So as Human Philosophy is either Simple and Particular, or Conjugate and Civil. Humanity Particular consisteth of the same parts whereof man consisteth; that is, of knowledges which respect the Body, and of knowledges that respect the Mind. But before we distribute so far, it is good to constitute. For I do take the consideration in general and at large of Human Nature to be fit to be emancipate and made a knowledge by itself; not so much in regard of those delightful and elegant discourses which have been made of the dignity of man [2], of his miseries, of his state and life, and the like *adjuncts of his common and undivided nature;* but chiefly in regard of the knowledge concerning the *sympathies and concordances between the mind and body*, which, being mixed, cannot be properly assigned to the sciences of either.

This knowledge hath two branches: for as all leagues and amities consist of mutual Intelligence and mutual Offices, so this league of mind and body hath these two parts; *how the one discloseth the other*, and *how the one worketh upon the other;* Discovery, and Impression. The former of these hath begotten two arts, both of Prediction or Prenotion; whereof the one is honoured with the inquiry of Aristotle, and the other of Hip-

[1] The translation adds, *quæ nunc quoque invaluit.*

[2] In the *De Augmentis* this part is numbered among the Desiderata. The *miseries* of man, he says, have been well set forth both by philosophers and theologians; but of what he calls the *triumphs* of man, (that is, instances of the highest perfection which the human faculties, mental or bodily, have exhibited,) he wishes a collection to be made from history; and gives a page or two of anecdotes by way of example.

pocrates. And although they have of later time been used to be coupled with superstitious and fantastical arts, yet being purged and restored to their true state, they have both of them a solid ground in nature, and a profitable use in life. The first is Physiognomy, which discovereth the disposition of the mind by the lineaments of the body. The second is the Exposition of Natural Dreams, which discovereth the state of the body by the imaginations of the mind. In the former of these I note a deficience.[1] For Aristotle hath very ingeniously and diligently handled the factures of the body, but not the gestures of the body, which are no less comprehensible by art, and of greater use and advantage. For the Lineaments of the body do disclose the disposition and inclination of the mind in general; but the Motions of the countenance and parts do not only so, but do further disclose the present humour and state of the mind and will. For as your Majesty saith most aptly and elegantly, *As the tongue speaketh to the ear, so the gesture speaketh to the eye.* And therefore a number of subtile persons, whose eyes do dwell upon the faces and fashions of men, do well know the advantage of this observation, as being most part of their ability; neither can it be denied but that it is a great discovery of dissimulations, and a great direction in business.

The latter branch, touching Impression, hath not been collected into art, but hath been handled dispersedly; and it hath the same relation or antistrophe that the former hath. For the consideration is double: Either *how, and how far the humours and affects*[2] *of the body do alter or work upon the mind;* or again, *how and how far the passions or apprehensions of the mind do alter or work upon the body.* The former of these hath been inquired and considered as a part and appendix of Medicine, but much more as a part of Religion or Superstition. For the physician prescribeth cures of the mind in phrensies and melancholy passions; and pretendeth also to exhibit medicines to exhilarate the mind, to confirm the courage, to clarify the wits, to corroborate the memory, and the like; but the scruples and

[1] With regard to the latter, of which nothing more is said here, he observes in the *De Augmentis* that the treatment it has received is full of follies, and not grounded upon the most solid basis, — which is that when the same sensation is produced in the sleeper by an internal cause which is usually the effect of some external act, he will dream of that act; as in the case of nightmare, where the sensation of oppression on the stomach created by the fumes of indigestion makes a man dream that his body is oppressed by a weight superimposed.

[2] *temperamentum.* — De Aug.

superstitions of diet and other regiment of the body in the sect of the Pythagoreans, in the heresy of the Manicheans, and in the law of Mahomet, do exceed. So likewise the ordinances in the Ceremonial Law, interdicting the eating of the blood and the fat, distinguishing between beasts clean and unclean for meat, are many and strict. Nay the faith itself being clear and serene from all clouds of Ceremony, yet retaineth the use of fastings, abstinences, and other macerations and humiliations of the body, as things real, and not figurative.[1] The root and life of all which prescripts is, (besides the ceremony[2],) the consideration of that dependency which the affections of the mind are submitted unto upon the state and disposition of the body. And if any man of weak judgment do conceive that this suffering of the mind from the body doth either question the immortality or derogate from the sovereignty of the soul, he may be taught in easy instances, that the infant in the mother's womb is compatible with the mother[3] and yet separable; and the most absolute monarch is sometimes led by his servants and yet without subjection. As for the reciprocal knowledge, which is the operation of the conceits and passions of the mind upon the body, we see all wise physicians in the prescriptions of their regiments to their patients do ever consider *accidentia animi*, as of great force to further or hinder remedies or recoveries; and more specially it is an inquiry of great depth and worth concerning Imagination, how and how far it altereth the body proper of the imaginant. For although it hath a manifest power to hurt, it followeth not it hath the same degree of power to help; no more than a man can conclude, that because there be pestilent airs, able suddenly to kill a man in health, therefore there should be sovereign airs, able suddenly to cure a man in sickness. But the inquisition of this part is of great use, though it needeth, as Socrates said, *a Delian diver*, being difficult and profound. But unto all this knowledge *de communi vinculo*, of the concordances between the mind and the body, that part of inquiry is most necessary, which considereth of the *seats* and *domiciles* which the several faculties of the mind do take and occupate in the organs of the body; which knowledge hath been attempted, and is controverted, and deserveth to be

[1] *tanquam rerum non mere ritualium sed etiam fructuosarum.* — De Aug.

[2] The translation adds, "and the exercise of obedience."

[3] *i. e.* suffers together with the mother: *simul cum matribus affectibus compatitur.*

much better enquired. For the opinion of Plato, who placed *the understanding in the brain, animosity* (which he did unfitly call *anger*, having a greater mixture with *pride*) *in the heart*, and *concupiscence or sensuality in the liver*, deserveth not to be despised; but much less to be allowed.[1] So then we have constituted (as in our own wish and advice) the inquiry *touching human nature entire*, as a just portion of knowledge to be handled apart.

¶ [2] The knowledge that concerneth man's body is divided as the good of man's body is divided, unto which it referreth. The good of man's body is of four kinds, Health, Beauty, Strength, and Pleasure: so the knowledges are Medicine, or art of Cure; art of Decoration, which is called Cosmetic; art of Activity, which is called Athletic; and art Voluptuary, which Tacitus truly calleth *eruditus luxus*, [educated luxury]. This subject of man's body is of all other things in nature most susceptible of remedy; but then that remedy is most susceptible of error. For the same subtility of the subject doth cause large possibility and easy failing; and therefore the inquiry ought to be the more exact.

To speak therefore of Medicine, and to resume that we have said, ascending a little higher: The ancient opinion that man was Microcosmus, an abstract or model of the world, hath been fantastically strained by Paracelsus and the alchemists, as if there were to be found in man's body certain correspondences and parallels, which should have respect to all varieties of things, as stars, planets, minerals, which are extant in the great world. But thus much is evidently true, that of all substances which nature hath produced, man's body is the most extremely compounded. For we see herbs and plants are nourished by earth and water; beasts for the most part by herbs and fruits; man by the flesh of beasts, birds, fishes, herbs, grains, fruits, water, and the manifold alterations, dressings, and preparations of these several bodies, before they come to be his food and aliment. Add hereunto that beasts have a more simple order of life, and less change of affections to work upon their bodies; whereas man in his mansion, sleep, exercise, passions, hath infinite variations; and it cannot be denied but that the Body

[1] Neither (he adds in the translation) is that other arrangement free from error, which places the several intellectual faculties, Imagination, Reason, and Memory, in the several ventricles of the brain.

[2] De Aug. iv. 2.

of man of all other things is of the most compounded mass. The Soul on the other side is the simplest of substances, as is well expressed,

Purumque reliquit
Æthereum sensum atque auraï simplicis ignem:
[Pure and unmixed
The etherial sense is left—mere air and fire.]

So that it is no marvel though the soul so placed enjoy no rest, if that principle be true that *Motus rerum est rapidus extra locum, placidus in loco:* [things move rapidly to their place and calmly in their place]. But to the purpose. This variable composition of man's body hath made it as an instrument easy to distemper; and therefore the poets did well to conjoin Music and Medicine in Apollo: because the office of medicine is but to tune this curious harp of man's body and to reduce it to harmony. So then the subject being so variable hath made the art by consequent more conjectural; and the art being conjectural hath made so much the more place to be left for imposture. For almost all other arts and sciences are[1] judged by acts or masterpieces[2], as I may term them, and not by the successes and events. The lawyer is judged by the virtue of his pleading, and not by the issue of the cause. The master in the ship is judged by the directing his course aright, and not by the fortune of the voyage. But the physician, and perhaps the politique, hath no particular acts demonstrative of his ability, but is judged most by the event; which is ever but as it is taken: for who can tell, if a patient die or recover, or if a state be preserved or ruined, whether it be art or accident? And therefore many times the impostor is prized, and the man of virtue taxed. Nay, we see [the[3]] weakness and credulity of men is such, as they will often prefer a montabank[4] or witch before a learned physician. And therefore the poets were clear-sighted in discerning this extreme folly, when they made Æsculapius and Circe brother and sister, both children of the sun, as in the verses,

Ipse repertorem medicinæ talis et artis
Fulmine *Phœbigenam* Stygias detrusit ad undas:

[1] So edd. 1629 and 1633. The original omits *are*.
[2] *virtute sua et functione*. — De Aug.
[3] *the* omitted both in the original and in edd. 1629 and 1633.
[4] This is the spelling of the old editions; and ought apparently to be revived by those who believe that our orthography is the guardian of our etymologies.

[*Apollo's son* from whom that art did grow
Jove struck with thunder to the shades below].

And again,

Dives inaccessos ubi *Solis filia* lucos, &c.
[Now by the shelves of Circe's coast they run,—
Circe the rich, the *daughter of the sun*.[1]]

For in all times, in the opinion of the multitude, witches and old women and impostors have had a competition with physicians. And what followeth? Even this, that physicians say to themselves, as Salomon expresseth it upon an higher occasion; *If it befal to me as befalleth to the fools, why should I labour to be more wise?* And therefore I cannot much blame physicians, that they use commonly to intend some other art or practice, which they fancy, more than their profession. For you shall have of them antiquaries, poets, humanists, statesmen, merchants, divines, and in every of these better seen than in their profession; and no doubt upon this ground, that they find that mediocrity and excellency in their art maketh no difference in profit or reputation towards their fortune; for the weakness of patients and sweetness of life and nature of hope[2] maketh men depend upon physicians with all their defects. But nevertheless these things which we have spoken of are courses begotten between a little occasion and a great deal of sloth and default; for if we will excite and awake our observation, we shall see in familiar instances what a predominant faculty the *subtilty of spirit*[3] hath over the *variety of matter or form.* Nothing more variable than faces and countenances; yet men can bear in memory the infinite distinctions of them; nay, a painter with a few shells of colours, and the benefit of his eye and habit of his imagination, can imitate them all that ever have been, are, or may be, if they were brought before him. Nothing more variable than voices; yet men can likewise discern them personally; nay, you shall have a *buffon* or *pantomimus* will express as many as he pleaseth. Nothing more variable than the differing sounds of words; yet men have found the way to reduce them to a few simple letters. So that it is not *the insufficiency or incapacity of man's mind*, but it is *the remote standing or placing thereof*, that breedeth these mazes and incomprehensions: for as the sense afar off is

[1] Dryden. [2] The translation adds *et amicorum commendatio.*
[3] *i. e.* of the understanding: *intellectûs subtilitas et acumen.*

full of mistaking but is exact at hand, so is it of the understanding; the remedy whereof is not to quicken or strengthen the organ, but to go nearer to the object; and therefore there is no doubt but if the physicians will learn and use the true approaches and avenues of nature, they may assume as much as the poet saith:

Et quoniam variant morbi, variabimus artes;
Mille mali species, mille salutis erunt:

[varying their arts according to the variety of diseases,— for a thousand forms of sickness a thousand methods of cure]. Which that they should do, the nobleness of their art doth deserve; well shadowed by the poets, in that they made Æsculapius to be the son of the Sun, the one being the fountain of life, the other as the second stream; but infinitely more honoured by the example of our Saviour, who made the body of man the object of his miracles, as the soul was the object of his doctrine. For we read not that ever he vouchsafed to do any miracle about honour, or money (except that one for giving tribute to Cæsar), but only about the preserving, sustaining, and healing the body of man.

Medicine is a science which hath been (as we have said) more professed than laboured, and yet more laboured than advanced; the labour having been, in my judgment, rather in circle than in progression. For I find much iteration, but small addition. It considereth *causes of diseases*, with the *occasions or impulsions;* the *diseases themselves*, with the *accidents;* and the *cures*, with the *preservations*.[1] The deficiencies which I think good to note, being a few of many, and those such as are of a more open and manifest nature, I will enumerate, and not place.

Narrationes medicinales.

The first is the discontinuance of the ancient and serious diligence of Hippocrates, which used to set down a narrative of the special cases of his patients, and how they proceeded, and how they were judged by recovery or

[1] Here the translation departs widely from the original. The parts, or offices, into which Medicine is divided in the *De Augmentis* are: 1. the preservation of health; 2. the cure of diseases; 3. the prolongation of life: with regard to the first of which Bacon complains that physicians have treated it in several respects unskilfully or imperfectly; and with regard to the last that they have not recognised the prolongation of natural life as a principal part of their science, being satisfied if they can prevent it from being shortened by diseases. Under the second he includes the whole doctrine of diseases, — the causes, the symptoms, and the remedies, all in fact that is here included under the general head of Medicine, — and so strikes again into the text.

death. Therefore having an example proper in the father of the art, I shall not need to allege an example foreign, of the wisdom of the lawyers, who are careful to report new cases and decisions for the direction of future judgments. This continuance of Medicinal History I find deficient; which I understand neither to be so infinite as to extend to every common case, nor so reserved as to admit none but wonders: for many things are new in the manner, which are not new in the kind; and if men will intend to observe, they shall find much worthy to observe.

Anatomia comparata.

In the inquiry which is made by Anatomy I find much deficience: for they inquire of the *parts*, and their *substances*, *figures*, and *collocations;* but they inquire not of the *diversities of the parts*[2], the *secrecies of the passages*, and the *seats or nestling of the humours*, nor much of the *footsteps and impressions of diseases:* the reason of which omission I suppose to be, because the first inquiry may be satisfied in the view of one or a few anatomies; but the latter, being comparative and casual, must arise from the view of many. And as to the diversity of parts, there is no doubt but the facture or framing of the inward parts is as full of difference as the outward, and in that is the *cause continent* of many diseases; which not being observed, they quarrel many times with the humours, which are not in fault; the fault being in the very frame and mechanic of the part, which cannot be removed by medicine alterative, but must be accommodate and palliate by diets and medicines familiar. And for the passages and pores, it is true which was anciently noted, that the more subtile of them appear not in anatomies, because they are shut and latent in dead bodies, though they be open and manifest in live: which being supposed, though the inhumanity of *anatomia vivorum* [anatomy of the living subject] was by Celsus justly reproved; yet in regard of the[2] great use of this observation, the inquiry needed not by him so slightly to have been relinquished altogether, or referred to the casual practices of surgery; but might have been well diverted upon the dissection of beasts alive, which notwithstanding the dissimilitude of their parts, may sufficiently satisfy this inquiry. And for the

[1] *i. e.* they inquire of the parts, &c., of the human body in general, but not of the diversities of the parts in different bodies, — of simple, but not of comparative, anatomy. This whole paragraph is much enlarged in the translation, and the order changed.

[2] So edd. 1629 and 1633. The original omits *the*.

humours, they are commonly passed over in anatomies as purgaments; whereas it is most necessary to observe what cavities, nests, and receptacles the humours do find in the parts, with the differing kind of the humour so lodged and received. And as for the footsteps of diseases, and their devastations of the inward parts, imposthumations, exulcerations, discontinuations, putrefactions, consumptions, contractions, extensions, convulsions, dislocations, obstructions, repletions, together with all preternatural substances, as stones, carnosities, excrescences, worms, and the like; they ought to have been exactly observed by multitude of anatomies and the contribution of men's several experiences, and carefully set down both historically according to the appearances, and artificially with a reference to the diseases and symptoms which resulted from them, in case where the anatomy is of a defunct patient; whereas now upon opening of bodies they are passed over slightly and in silence.

Inquisitio ulterior de Morbis insanabilibus.

In the inquiry of diseases, they do abandon the cures of many, some as in their nature incurable, and others as past the period of cure; so that Sylla and the triumvirs never proscribed so many men to die, as they do by their ignorant edicts; whereof[1] numbers do escape with less difficulty than they did in the Roman proscriptions. Therefore I will not doubt to note as a deficience, that they inquire not the perfect cures of many diseases, or extremities of diseases, but pronouncing them incurable do enact a law of neglect, and exempt ignorance from discredit.

De Euthanasia exteriore.

Nay further, I esteem it the office of a physician not only to restore health, but to mitigate pain and dolors; and not only when such mitigation may conduce to recovery, but when it may serve to make a fair and easy passage: for it is no small felicity which Augustus Cæsar was wont to wish to himself, that same *Euthanasia;* and which was specially noted in the death of Antoninus Pius, whose death was after the fashion and semblance of a kindly and pleasant sleep. So it is written of Epicurus, that after his disease was judged desperate, he drowned his stomach and senses with a large draught and ingurgitation of wine; whereupon the epigram was made, *Hinc stygias ebrius hausit aquas;* he was not sober enough to taste any bitterness of the Stygian water. But the physicians contrariwise do make a kind of scruple and

[1] *i. e.* of whom nevertheless: *quorum tamen plurimi &c.* —De Aug.

religion to stay with the patient after the disease is deplored; whereas, in my judgment, they ought both to enquire the skill and to give the attendances for the facilitating and assuaging of the pains and agonies of death.

Medicinæ Experimentales.

In the consideration of the Cures of diseases, I find a deficience in the receipts of propriety respecting the particular cures of diseases [1]: for the physicians have frustrated the fruit of tradition and experience by their magistralities, in adding and taking out and changing *quid pro quo* in their receipts, at their pleasures; commanding so over the medicine as the medicine cannot command over the disease. For except it be treacle and mithridatum, and of late *diascordium*[2], and a few more, they tie themselves to no receipts severely and religiously: for as to the confections of sale which are in the shops, they are for readiness and not for propriety; for they are upon general intentions of purging, opening, comforting, altering, and not much appropriate to particular diseases: and this is the cause why empirics and old women are more happy many times in their cures than learned physicians, because they are more religious in holding their medicines. Therefore here is the deficience which I find, that physicians have not, partly out of their own practice, partly out of the constant probations reported in books, and partly out of the traditions of empirics, set down and delivered over certain *experimental medicines* for the cure of particular diseases, besides their own *conjectural* and *magistral descriptions.* For as they were the men of the best composition in the state of Rome, which either being consuls inclined to the people, or being tribunes inclined to the senate; so in the matter we now handle, they be the best physicians, which being learned incline to the traditions of experience, or being empirics incline to the methods of learning.

Imitatio Naturæ in Balneis et Aquis Medicinalibus

In preparation of Medicines, I do find strange, specially considering how mineral medicines have been extolled, and that they are safer for the outward than inward parts, that no man hath sought to make an imitation by art of Natural Baths and Medicinable Fountains; which nevertheless are confessed to receive their virtues from

[1] *i. e.* the particular medicines proper for particular diseases, as distinguished from "general intentions."

[2] In the translation he adds "the confection of Alkermes."

minerals: and not so only, but discerned and distinguished from what particular mineral they receive tincture, as sulphur, vitriol, steel, or the like; which nature if it may be reduced to compositions of art, both the variety of them will be increased, and the temper of them will be more commanded. [1]

Filum Medicinale, sive de vicibus Medicinarum

But lest I grow to be more particular than is agreeable either to my intention or to proportion, I will conclude this part with the note of one deficience more, which seemeth to me of greatest consequence; which is, that the prescripts in use are too compendious to attain their end: for, to my understanding, it is a vain and flattering opinion to think any medicine can be so sovereign or so happy, as that the receit or use of it can work any great effect upon the body of man. It were a strange speech which spoken, or spoken oft, should reclaim a man from a vice to which he were by nature subject. It is order, pursuit, sequence, and interchange of application, which is mighty in nature; which although it require more exact knowledge in prescribing and more precise obedience in observing, yet is recompensed with the magnitude of effects. And although a man would think, by the daily visitations of the physicians, that there were a pursuance in the cure; yet let a man look into their prescripts and ministrations, and he shall find them but inconstancies and every day's devices, without any settled providence or project. Not that every scrupulous or superstitious prescript is effectual, no more than every straight way is the way to heaven; but the *truth of the direction* must precede *severity of observance.*[2]

For Cosmetic, it hath parts civil, and parts effeminate: for cleanness of body was ever esteemed to proceed from a due reverence to God, to society, and to ourselves.[3] As for artificial decoration, it is well worthy of the deficiencies which it

[1] So edd. 1629 and 1633. The original has *commended.*

[2] The latter part of this paragraph is considerably enlarged in the translation, rather however by way of explanation than addition, till he comes to the end; when in closing his account of the *Desiderata* in the science of curing diseases, he adds that there is however one other remaining which is of more consequence than all the rest — namely that of a true and active Natural Philosophy for the Science of Medicine to be built upon.

Between this paragraph and the next is interposed a long passage upon the prolongation of life, of which there are no traces at all here.

[3] To whom (he adds in the translation) we owe no less reverence — nay even more — than to others. So in the *New Atlantis*, "and they say (*i. e.* the people of Bensalem) that the reverence of a man's self is, next to Religion, the chiefest bridle of all vices."

hath; being neither fine enough to deceive, nor handsome to use, nor wholesome to please.[1]

For Athletic, I take the subject of it largely; that is to say, for any point of ability whereunto the body of man may be brought, whether it be of *activity* or of *patience;* whereof activity hath two parts, *strength* and *swiftness;* and patience likewise hath two parts, *hardness against wants and extremities,* and *indurance of pain or torment:* whereof we see the practices in tumblers, in savages [2], and in those that suffer punishment: nay, if there be any other faculty which falls not within any of the former divisions, as in those that dive, that obtain a strange power of containing respiration, and the like, I refer it to this part. Of these things the practices are known, but the philosophy that concerneth them is not much enquired; the rather, I think, because they are supposed to be obtained either by an aptness of nature, which cannot be taught, or only by continual custom, which is soon prescribed; which though it be not true, yet I forbear to note any deficiences; for the Olympian Games are down long since, and the mediocrity of these things is for use; as for the excellency of them, it serveth for the most part but for mercenary ostentation.

For Arts of Pleasure Sensual, the chief deficience in them is of laws to repress them.[3] For as it hath been well observed that the arts which flourish in times while virtue is in growth, are military; and while virtue is in state, are liberal; and while virtue is in declination, are voluptuary; so I doubt that

[1] So all the editions. He must have meant to write, "handsome to please, nor wholesome to use."

By artificial decoration he means painting the face, as we learn from the translation; where he expresses wonder that this *prava consuetudo fucandi* is not prohibited by the laws, along with sumptuous apparel and lovelocks.

[2] The translation adds "in the stupendous strength shown by maniacs."

[3] Here we have an important addition in the translation. Whether when he wrote the *Advancement of Learning* Bacon had forgotten Painting and Music or meant to find another place for them, I cannot say; but in the *De Augmentis* he includes them among the *Artes Voluptariæ;* which he cannot have intended to do when he wrote this sentence. The passage in which they are introduced is to this effect:— The arts of pleasure, he says, are as many as the senses themselves are. To the eye belongs Painting, with innumerable other arts of magnificence in matter of Buildings, Gardens, Dresses, Vases, Gems, &c.; to the ear Music, with its various apparatus of voices, wind, and strings; and of all the sensual arts those which relate to Sight and Hearing are accounted the most liberal; for as these two senses are the purest and most chaste, so the sciences which belong to them are the most learned; both being waited upon by the Mathematics, and one having some relation to memory and demonstrations, the other to manners and affections of the mind. The rest of the sensual pleasures, with the arts appertaining to them, are held in less honour, as being nearer akin to luxury and magnificence. Unguents, perfumes, delicacies of the table, and especially stimulants of lust, stand more in need of a censor to repress than a master to teach them; and as it has been well observed, &c.

this age of the world is somewhat upon the descent of the wheel. With arts *voluptuary* I couple practices *joculary;* for the deceiving of the senses is one of the pleasures of the senses. As for games of recreation, I hold them to belong to civil life and education.[1] And thus much of that particular Human Philosophy which concerns the Body, which is but the tabernacle of the mind.

¶ [2]For Human Knowledge which concerns the Mind, it hath two parts; the one that enquireth of *the substance or nature of the soul or mind,* the other that enquireth of *the faculties or functions thereof.* Unto the first of these, the considerations of *the original of the soul,* whether it be *native or adventive,* and *how far it is exempted from laws of matter,* and of the *immortality thereof,* and many other points, do appertain: which have been not more laboriously enquired than variously reported; so as the travail therein taken seemeth to have been rather in a maze than in a way. But although I am of opinion that this knowledge may be more really and soundly enquired, even in nature, than it hath been; yet I hold that in the end it must be bounded by religion, or else it will be subject to deceit and delusion; for as the substance of the soul in the creation was not extracted out of the mass of heaven and earth by the benediction of a *producat,* but was immediately inspired from God; so it is not possible that it should be (otherwise than by accident) subject to *the laws of heaven and earth,* which are *the subject of philosophy;* and therefore the true knowledge of the nature and state of the soul, must come by the same inspiration that gave the substance.[3] Unto this part of knowledge touching the soul there be two appendices; which, as they have been

[1] This observation is omitted in the translation; and a new paragraph is introduced, stating that everything which relates to the body of man (though there be some which do not properly belong to either of the three offices above mentioned, viz. the preservation of health, the cure of diseases, and the prolongation of life) is to be considered as included in Medicine.

[2] De Aug. iv. 3.

[3] In the translation a new division is introduced which does not appear to be distinctly recognised here — the human soul being divided into Rational and Irrational; the one divine and peculiar to humanity, the other (which is merely its instrument) being of the earth and common to man and brute; and the remark in the text is confined to the first of these only. The other soul, which he calls the *anima sensibilis sive producta,* is represented as a fit subject of physical enquiry, in its nature and substance as well as in its faculties; though the enquiry has not been well pursued with regard to either. Concerning the doctrine of the Duality of the Soul see Mr. Ellis's General Introduction, § 14.

handled, have rather vapoured forth fables than kindled truth; Divination and Fascination.

Divination hath been anciently and fitly divided into *artificial* and *natural;* whereof *artificial* is when the mind maketh a prediction by argument, concluding upon signs and tokens; *natural* is when the mind hath a presention by an internal power, without the inducement of a sign. Artificial is of two sorts; either when the argument is coupled with a derivation of causes, which is *rational;* or when it is only grounded upon a coincidence of the effect, which is *experimental:* whereof the later for the most part is superstitious; such as were the heathen observations upon the inspection of sacrifices, the flights of birds, the swarming of bees; and such as was the Chaldean Astrology, and the like. For *artificial divination,* the several kinds thereof are distributed amongst particular knowledges. The Astronomer hath his predictions, as of conjunctions, aspects, eclipses, and the like. The Physician hath his predictions, of death, of recovery, of the accidents and issues of diseases. The Politique hath his predictions; *O urbem venalem, et cito perituram, si emptorem invenerit!* [a city in which all things are for sale and which will fall to the first purchaser,] which stayed not long to be performed, in Sylla first, and after in Cæsar. So as these predictions are now impertinent, and to be referred over. But the divination which springeth from the internal nature of the soul, is that which we now speak of; which hath been made to be of two sorts, *primitive* and by *influxion.* Primitive is grounded upon the supposition that the mind, when it is withdrawn and collected into itself and not diffused into the organs of the body, hath some extent and latitude of prenotion; which therefore appeareth most in sleep, in extasies, and near death; and more rarely in waking apprehensions; and is induced and furthered by those abstinences and observances which make the mind most to consist in itself. By influxion is grounded upon the conceit that the mind, as a mirror or glass, should take illumination from the foreknowledge of God and spirits; unto which the same regiment doth likewise conduce. For the retiring of the mind within itself is the state which is most susceptible of divine influxions; save that it is accompanied in this case with a fervency and elevation (which the ancients noted by *fury*), and not with a repose and quiet, as it is in the other.

Fascination is the power and act of imagination, intensive upon other bodies than the body of the imaginant: for of that we spake in the proper place: wherein the school of Paracelsus and the disciples of pretended Natural Magic have been so intemperate, as they have exalted the power of the imagination to be much one with the power of miracle-working faith; others that draw nearer to probability, calling to their view the secret passages of things, and especially of the contagion that passeth from body to body[1], do conceive it should likewise be agreeable to nature that there should be some transmissions and operations from spirit to spirit, without the mediation of the senses; whence the conceits have grown (now almost made civil) of the Mastering Spirit, and the force of confidence, and the like. Incident unto this is the inquiry how to raise and fortify the imagination; for if the imagination fortified have power, then it is material to know how to fortify and exalt it. And herein comes in crookedly and dangerously a palliation of a great part of Ceremonial Magic. For it may be pretended that Ceremonies, Characters, and Charms, do work not by any tacit or sacramental contract with evil spirits, but serve only to strengthen the imagination of him that useth it; as images are said by the Roman church[2] to fix the cogitations and raise the devotions of them that pray before them. But for mine own judgment, if it be admitted that imagination hath power, and that Ceremonies fortify imagination, and that they be used sincerely and intentionally for that purpose[3]; yet I should hold them unlawful, as opposing to that first edict which God gave unto man, *In sudore vultus comedes panem tuum,* [in the sweat of thy brow shalt thou eat bread]. For they propound those noble effects which God hath set forth unto man to be bought at the price of labour, to be attained by a few easy and slothful observances. Deficiences in these knowledges I will report none, other than the general deficience, that it is not known how much of them is verity and how much vanity.[4]

[1] In the translation he adds "the irradiations of the senses, and the conveyance of magnetic virtues."

[2] In the translation, the words "said by the Roman church" are omitted, and *in Religione usus imaginum . . . . invaluit* are substituted. See note p. 277.

[3] *i. e.* as a physical remedy, without any thought of inviting thereby the assistance of spirits, — as explained in the translation.

[4] This sentence is omitted in the translation altogether; and the chapter concludes with a notice at considerable length of two *Desiderata* not mentioned here; the doctrine of Voluntary Motion, and the doctrine of Sense and the Sensible.

¶[1] The knowledge which respecteth the Faculties of the Mind of man is of two kinds; the one respecting his Understanding and Reason, and the other his Will, Appetite, and Affection; whereof the former produceth Position or Decree, the later Action or Execution. It is true that the Imagination is an agent or *nuncius* in both provinces, both the judicial and the ministerial. For Sense sendeth over to Imagination before Reason have judged: and Reason sendeth over to Imagination before the Decree can be acted; for Imagination ever precedeth Voluntary Motion: saving that this Janus of Imagination hath differing faces; for the face towards Reason hath the print of Truth, but the face towards Action hath the print of Good; which nevertheless are faces,

Quales decet esse sororum, —

[sister-faces]. Neither is the Imagination simply and only a messenger; but is invested with or at leastwise usurpeth no small authority in itself, besides the duty of the message. For it was well said by Aristotle, *That the mind hath over the body that commandment, which the lord hath over a bondman; but that reason hath over the imagination that commandment which a magistrate hath over a free citizen;* who may come also to rule in his turn. For we see that in matters of Faith and Religion we raise our Imagination above our Reason[2]; which is the cause why Religion sought ever access to the mind by similitudes, types, parables, visions, dreams. And again in all persuasions that are wrought by eloquence and other impression of like nature, which do paint and disguise the true appearance of things, the chief recommendation unto Reason is from the Imagination.[3] Nevertheless, because I find not any science that doth properly or fitly pertain to the Imagination, I see no cause to alter the former division. For as for Poesy, it is rather a pleasure or play of imagination, than a work or duty thereof. And if it be a work, we speak not now of such parts of learning as the

[1] De Aug. v. 1.

[2] Not, (he adds in the translation,) that the divine illumination resides in the Imagination, — its seat being rather in the very citadel of the mind and understanding; — but that the divine grace uses the motions of the Imagination as an instrument of illumination, just as it uses the motions of the will as an instrument of virtue.

[3] This is better explained in the translation; where it is observed that the arts of speech by which men's minds are soothed, inflamed, or carried away, consist in exciting the Imagination till it gets the better of the Reason.

Imagination produceth, but of such sciences as handle and consider of the Imagination; no more than we shall speak now of such knowledges as Reason produceth, (for that extendeth to all philosophy,) but of such knowledges as do handle and inquire of the faculty of Reason: so as Poesy had his true place.[1] As for the power of the Imagination in nature, and the manner of fortifying the same, we have mentioned it in the doctrine *De Anima*, whereunto most fitly it belongeth. And lastly, for Imaginative or Insinuative Reason, which is the subject of Rhetoric, we think it best to refer it to the Arts of Reason. So therefore we content ourselves with the former division, that Human Philosophy which respecteth the faculties of the mind of man hath two parts, Rational and Moral.

The part of Human Philosophy which is rational, is of all knowledges, to the most wits, the least delightful; and seemeth but a net of subtility and spinosity. For as it was truly said, that knowledge is *pabulum animi*, [the food of the mind;] so in the nature of men's appetite to this food, most men are of the taste and stomach of the Israelites in the desert, that would fain have returned *ad ollas carnium*, [to the flesh-pots,] and were weary of manna; which, though it were celestial, yet seemed less nutritive and comfortable. So generally men taste well knowledges that are drenched in flesh and blood, Civil History, Morality, Policy, about the which men's affections, praises, fortunes, do turn and are conversant; but this same *lumen siccum*, [this dry light,] doth parch and offend most men's watery and soft natures. But to speak truly of things as they are in worth, Rational Knowledges are the keys of all other arts; for as Aristotle saith aptly and elegantly, *That the hand is the Instrument of Instruments, and the mind is the Form of Forms:* so these be truly said to be the Art of Arts: neither do they only direct, but likewise confirm and strengthen; even as the habit of shooting doth not only enable to shoot a nearer shoot, but also to draw a stronger bow.

The Arts Intellectual are four in number; divided according

[1] This whole sentence is omitted in the translation; the reason for not altering the former division being stated simply thus: *Nam Phantasia scientias fere non parit; siquidem Poesis (quæ a principio Phantasiæ attributa est) pro lusu potius ingenii quam pro scientia habenda.* Poesy, which belongs properly to Imagination, is not to be considered as a part of *knowledge;* and the two other offices of the Imagination belong, one to the doctrine *de anima*, the other to Rhetoric. There is no occasion therefore to make a place for Imagination among the parts of knowledge which concern the faculties of the human mind.

to the ends whereunto they are referred: for man's labour is to *invent*[1] that which is *sought* or *propounded;* or to *judge* that which is *invented;* or to *retain* that which is *judged;* or to *deliver over* that which is *retained.* So as the arts must be four; Art of Inquiry or Invention: Art of Examination or Judgment; Art of Custody or Memory; and Art of Elocution or Tradition.

¶[2] Invention is of two kinds, much differing; the one, of Arts and Sciences; and the other, of Speech and Arguments. The former of these I do report deficient; which seemeth to me to be such a deficience as if in the making of an inventory touching the estate of a defunct it should be set down *that there is no ready money.* For as money will fetch all other commodities, so this knowledge is that which should purchase all the rest. And like as the West-Indies had never been discovered if the use of the mariner's needle had not been first discovered, though the one be vast regions and the other a small motion; so it cannot be found strange if sciences be no further discovered, if the art itself of invention and discovery hath been passed over.

That this part of knowledge is wanting, to my judgment standeth plainly confessed: for first, Logic doth not pretend to invent Sciences or the Axioms of Sciences, but passeth it over with a *cuique in sua arte credendum,* [the knowledge that pertains to each art must be taken on trust from those that profess it]. And Celsus acknowledgeth it[3] gravely, speaking of the empirical and dogmatical sects of physicians, *That medicines and cures were first found out, and then after the reasons and causes were discoursed; and not the causes first found out, and by light from them the medicines and cures discovered.* And Plato in his Theætetus[4] noteth well, *That particulars are infinite, and the higher generalities give no sufficient direction; and that the pith of all sciences, which maketh the arts-man differ from the inexpert, is in the middle propositions, which in every particular knowledge are taken from tradition and experience.* And therefore we see that they which discourse of the inven-

[1] It may perhaps be worth while to observe that Bacon uses the word *invent* simply as equivalent to *invenire* — to find out.

[2] De Aug. v. 2.

[3] See note on Nov. Org. i. 73.

[4] Instead of "Plato *in his Theætetus* noteth" the translation has *Plato non semel innuit.* See note Vol. I. p. 617.

tions and originals of things, refer them rather to chance than to art, and rather to beasts, birds, fishes, serpents, than to men.

> Dictamnum genetrix Cretæa carpit ab Ida,
> Puberibus caulem foliis et flore comantem
> Purpureo: non illa feris incognita capris
> Gramina, cum tergo volucres hæsere sagittæ.
>
> [A sprig of dittany his mother brought,
> Gathered by Cretan Ide; a stalk it is
> Of woolly leaf, crested with purple flower;
> Which well the wild-goat knows when in his side
> Sticks the winged shaft.]

So that it was no marvel (the manner of antiquity being to consecrate inventors) that the Ægyptians had so few human idols in their temples, but almost all brute:

> Omnigenumque Deum monstra, et latrator Anubis,
> Contra Neptunum et Venerem, contraque Minervam, &c.
>
> [All kinds and shapes of Gods, a monstrous host,
> The dog Anubis foremost, stood arrayed
> 'Gainst Neptune, Venus, Pallas, &c.]

And if you like better the tradition of the Grecians, and ascribe the first inventions to men, yet you will rather believe that Promethcus first struck the flints, and marvelled at the spark, than that when he first struck the flints he expected the spark; and therefore we see the West-Indian Prometheus had no intelligence with the European, because of the rareness with them of flint, that gave the first occasion.[1] So as it

[1] This curious passage, which is omitted in the *De Augmentis*, must refer to what Bacon had read in Ramusio of the way in which the natives of the West Indian islands kindled their fires, by rubbing pieces of wood together. Several passages in Bacon's writings show that he was a reader of Ramusio. See Ramusio, vol. iii. p. 103. a. for Oviedo's description of the method.

In reality the coincidence between the customary mode of kindling fire in the West Indies and the superstitious usages of Europe is remarkable. The latter seem to point back to a time when the use of steel and flint was unknown. The Noth-feuer of the Germans was kindled by rubbing pieces of wood together. This fire, originally connected with the worship of Fro, was lighted when cattle were threatened with murrain, and they were made to pass through it. Dr. Jamieson in his Scottish Dictionary mentions precisely the same practice at a comparatively recent period in Scotland in a case in which the murrain had done great mischief. The long continuance of this practice is a sort of illustration of Spinosa's bitter remark that Superstition is the child of Adversity, there being no man, he observes, who in prosperity does not think himself wise enough to take care of himself. See Spinosa, *Tract. Theol. Politicus*, chap. i.: and for the German superstition Wolf's *Die Deutsche Götterlehre*, pp. 27. 83.

The holy fire of Vesta, according to Festus (in voce *Ignis*), was rekindled when it had been allowed to go out, by friction of two pieces of wood. Plutarch's statement that the rays of the sun concentrated by reflexion were employed for the purpose

should seem that hitherto men are rather beholden to a wild goat for surgery, or to a nightingale for music, or to the Ibis for some part of physic[1], or to the pot lid that flew open for artillery, or generally to chance or any thing else, than to Logic, for the invention of arts and sciences. Neither is the form of invention which Virgil describeth much other:

> Ut varias usus meditando extunderet artes
> Paulatim:

[that practice with meditation might by degrees hammer out the arts]. For if you observe the words well, it is no other method than that which brute beasts are capable of, and do put in ure; which is *a perpetual intending or practising some one thing, urged and imposed by an absolute necessity of conservation of being:* for so Cicero saith very truly, *Usus uni rei deditus et naturam et artem sæpe vincit:* [practice applied constantly to one thing will often do more than either nature or art can]. And therefore if it be said of men,

> Labor omnia vincit
> Improbus, et duris urgens in rebus egestas,
> [Stern labour masters all,
> And want in poverty importunate,]

it is likewise said of beasts, *Quis psittaco docuit suum χαῖρε?* [who taught the parrot to say how d'ye do?] Who taught the raven in a drowth to throw pebbles into an hollow tree where she spied water, that the water might rise so as she might come to it? Who taught the bee to sail through such a vast sea of air, and to find the way from a field in flower a great way off to her hive? Who taught the ant to bite every grain of corn that she burieth in her hill, lest it should take root and grow? Add then the word *extundere*, which importeth the extreme difficulty, and the word *paulatim*, which importeth the extreme slowness, and we are where we were, even amongst the Ægyptians'

seems improbable, and is apparently founded on a misconception or mistranslation of some earlier account of the matter. Pliny mentions, but without reference to Vesta, this mode of kindling fire, and states that the best combination is laurel wood with ivy. — *R. L. E.*

It is worth observing that though the passage in the text is omitted in the *De Augmentis*, the substance of it is retained in the *Cogitata et Visa*. *Nam ideo in ignis invento Prometheum Novæ Indiæ ab Europæo dissensisse, quod apud eos silicis non est copia.*— *J. S.*

[1] *pro lavationibus intestinorum.* — De Aug.

gods; there being little left to the faculty of Reason, and nothing to the duty of Art, for matter of invention.

Secondly, the induction which the logicians speak of, and which seemeth familiar with Plato[1], whereby the Principles of sciences may be pretended to be invented, and so the middle propositions by derivation from the principles,—their form of induction, I say, is utterly vicious and incompetent: wherein their error is the fouler, because it is the duty of Art to perfect and exalt Nature; but they contrariwise have wronged, abused, and traduced nature. For he that shall attentively observe how the mind doth gather this excellent dew of knowledge, like unto that which the poet speaketh of, *Aërei mellis cœlestia dona*, [the gift of heaven, aërial honey,] distilling and contriving it out of particulars natural and artificial, as the flowers of the field and garden, shall find that the mind of herself by nature doth manage and act an induction much better than they describe it. For to conclude *upon an enumeration of particulars without instance contradictory* is no conclusion, but a conjecture; for who can assure (in many subjects) upon those particulars which appear of a side, that there are not other on the contrary side which appear not? As if Samuel should have rested upon those sons of Issay[2] which were brought before him, and failed of David, which was in the field. And this form (to say truth) is so gross, as it had not been possible for wits so subtile as have managed these things to have offered it to the world, but that they hasted to their *theories* and *dogmaticals*, and were imperious and scornful toward particulars; which their manner was to use but as *lictores* and *viatores*, for sergeants and whifflers, *ad summovendam turbam*, to make way and make room for their opinions, rather than in their true use and service. Certainly it is a thing may touch a man with a religious wonder, to see how the footsteps of seducement are the very same in divine and human truth: for as in divine truth man cannot endure to become as a child; so in human, they reputed the attending the Inductions (whereof we speak) as if it were a second infancy or childhood.

Thirdly, allow some Principles or Axioms were rightly in-

[1] This reference to Plato is omitted in the translation, as well as the allusion to the derivation of the middle propositions. The induction in question is merely described as "the form of induction which Logic proposes, whereby to discover and prove the principles of sciences."

[2] So in all three editions. The *De Augmentis* has *Isai.*

duced, yet nevertheless certain it is that Middle Propositions cannot be deduced from them in subject of nature[1] by Syllogism, that is, *by touch and reduction of them to principles in a middle term.* It is true that in sciences popular, as moralities, laws, and the like, yea and divinity (because it pleaseth God to apply himself to the capacity of the simplest), that form may have use; and in natural philosophy likewise, by way of argument or satisfactory reason, *quæ assensum parit, operis effœta est,* [which procures assent but can do no work:] but the subtilty of nature and operations will not be enchained in those bonds: for Arguments consist of Propositions, and Propositions of Words; and Words are but the current tokens or marks of Popular Notions of things; which notions, if they be grossly and variably collected out of particulars, it is not the laborious examination either of consequences of arguments or of the truth of propositions, that can ever correct that error; being (as the physicians speak) in the first digestion: and therefore it was not without cause, that so many excellent philosophers became Sceptics and Academics, and denied any certainty of knowledge or comprehension, and held opinion that the knowledge of man extended only to appearances and probabilities. It is true that in Socrates it was supposed to be but a form of irony, *Scientiam dissimulando simulavit,* [an affectation of knowledge under pretence of ignorance:] for he used to disable his knowledge, to the end to enhance his knowledge[2]; like the humour of Tiberius in his beginnings, that would reign, but would not acknowledge so much[3]; and in the later Academy, which Cicero embraced, this opinion also of *acatalepsia* (I doubt) was not held sincerely: for that all those which excelled in copie of speech seem to have chosen that sect, as that which was fittest to give glory to their eloquence and variable discourses; being rather like progresses of pleasure than journeys to an end. But assuredly many scattered in both Academies did hold it in subtilty and integrity. But here was their chief error; they charged the deceit upon the Senses; which in my judgment (notwithstanding all their cavillations) are very sufficient to certify and report

[1] *in rebus naturalibus, quæ participant ex materiâ.*—De Aug.

[2] *i. e.* pretended not to know what it was plain he knew, that he might be thought to know likewise what he knew not — *renunciando scilicet iis quæ manifesto sciebat ut eo modo ea etiam quæ nesciebat scire putaretur.*

[3] This allusion to Tiberius is omitted in the translation.

truth, though not always immediately, yet by comparison[1], by help of instrument, and by producing and urging such things as are too subtile for the sense to some effect comprehensible by the sense, and other like assistance. But they ought to have charged the deceit upon *the weakness*[2] *of the intellectual powers, and upon the manner of collecting and concluding upon the reports of the senses.* This I speak not to disable the mind of man, but to stir it up to seek help: for no man, be he never so cunning or practised, can make a straight line or perfect circle by steadiness of hand, which may be easily done by help of a ruler or compass.[3]

Experientia literata, et interpretatio Naturæ.

This part of invention, concerning the invention of sciences, I purpose (if God give me leave) hereafter to propound; having digested it into two parts; whereof the one I term *Experientia literata*, and the other *Interpretatio Naturæ*[4]: the former being but a degree and rudiment of the latter. But I will not dwell too long, nor speak too great upon a promise.

¶[5] The invention of speech or argument is not properly an invention: for to invent is to discover that we know not, and not to recover or resummon that which we already know; and the use of this invention is no other but *out of the knowledge whereof our mind is already possessed, to draw forth or call before us that which may be pertinent to the purpose which we take into our consideration.* So as, to speak truly, it is no *Invention*, but a *Remembrance* or *Suggestion*, with an application; which is the cause why the schools do place it after

[1] There is nothing about comparison in the translation.

[2] In the translation he adds *contumacy — tum erroribus tum contumaciæ (quæ rebus ipsis morigera esse recusat)* — and also *pravis demonstrationibus;* an insertion which (though the observation is implied perhaps in the English) I have thought worth noticing; because these *pravæ demonstrationes* were Idols of the *Theatre*, of which in the *Advancement of Learning* there is no mention.

[3] This it is then (he adds, writing eighteen years later) which I have in hand, and am labouring with mighty effort to accomplish — namely to make the mind of man by help of art a match for the nature of things, — to discover an art of Indication and Direction whereby all other arts with their axioms and works may be detected and brought to light.

[4] The one being the method of inquiry which proceeds from one experiment to another by a kind of natural sagacity; the other that which proceeds from experiments to axioms, and thence by the light of the axioms to new experiments. *Aut enim defertur indicium ab experimentis ad experimenta, aut ab experimentis ad axiomata quæ et ipsa nova experimenta designent.* Of this *Experientia literata* there follows in the *De Augmentis* an exposition at considerable length; in which the several methods of experimenting are described, with illustrations. And this concludes the chapter, the exposition of the other part, the Interpretatio Naturæ, being reserved for the *Novum Organum.*

[5] De Aug. v. 3.

judgment, as subsequent and not precedent. Nevertheless, because we do account it a Chase as well of deer in an inclosed park as in a forest at large, and that it hath already obtained the name, let it be called invention: so as it be perceived and discerned, that the scope and end of this invention is readiness and present use of our knowledge, and not addition or amplification thereof.

To procure this ready use of knowledge there are two courses, Preparation and Suggestion.[1] The former of these seemeth scarcely a part of Knowledge, consisting rather of diligence than of any artificial erudition. And herein Aristotle wittily, but hurtfully, doth deride the sophists near his time, saying, *they did as if one that professed the art of shoe-making should not teach how to make up a shoe, but only exhibit in a readiness a number of shoes of all fashions and sizes.* But yet a man might reply, that if a shoe-maker should have no shoes in his shop, but only work as he is bespoken, he should be weakly customed. But our Saviour, speaking of Divine Knowledge, saith, *that the kingdom of heaven is like a good householder, that bringeth forth both new and old store;* and we see the ancient writers of rhetoric do give it in precept, that pleaders should have the Places whereof they have most continual use ready handled in all the variety that may be; as that, to speak for the literal interpretation of the law against equity, and contrary; and to speak for presumptions and inferences against testimony, and contrary. And Cicero himself, being broken unto it by great experience, delivereth it plainly, that whatsoever a man shall have occasion to speak of, (if he will take the pains) he may have it in effect premeditate, and handled *in thesi;* so that when he cometh to a particular, he shall have nothing to do but to put to names and times and places, and such other circumstances of individuals. We see likewise the exact diligence of Demosthenes; who, in regard of the great force that the entrance and access into causes hath to make a good impression, had ready framed a number of prefaces for orations and speeches. All which authorities and precedents may overweigh Aristotle's opinion, that would have us change a rich wardrobe for a pair of shears.

[1] In the translation he calls these respectively *Promptuaria* and *Topica:* the one being a collection of arguments such as you are likely to want, laid up ready for use; the other a system of directions to help you in looking for the thing you want to find.

But the nature of the collection of this provision or preparatory store, though it be common both to logic and rhetoric, yet having made an entry of it here, where it came first to be spoken of, I think fit to refer over the further handling of it to rhetoric.

The other part of Invention, which I term Suggestion, doth assign and direct us to certain *marks* or *places*, which may excite our mind to return and produce such knowledge as it hath formerly collected, to the end we may make use thereof. Neither is this use (truly taken) only to furnish argument to dispute probably with others, but likewise to minister unto our judgment to conclude aright within ourselves. Neither may these Places serve only to apprompt our invention, but also to direct our inquiry. For a faculty of wise interrogating is half a knowledge. For as Plato saith, *Whosoever seeketh, knoweth that which he seeketh for in a general notion; else how shall he know it when he hath found it?* And therefore the larger[1] your Anticipation is, the more direct and compendious is your search. But the same Places which will help us what to produce of that which we know already, will also help us, if a man of experience were before us, what questions to ask; or if we have books and authors to instruct us, what points to search and revolve: so as I cannot report[2] that this part of invention, which is that which the schools call Topics, is deficient.

Nevertheless Topics are of two sorts, *general* and *special*. The general we have spoken to; but the particular hath been touched by some, but rejected generally as inartificial and variable. But leaving the humour which hath reigned too

[1] *amplior et* certior. — De Aug.

[2] Thus the sentence stands both in the original and in the editions of 1629 and 1633; though I do not understand the connexion between it and the sentence preceding. Possibly an intermediate sentence has dropped out, or some alteration has been inadvertently made which disturbs the construction. In the translation the arrangement of the whole passage is changed, and all is made clear. He begins by dividing Topics into two kinds, General and Particular. The General (he says) has been sufficiently handled in Logic, and therefore he leaves it with a passing remark (*illud tamen obiter monendum videtur*) to the effect of that in the text; "neither is this use," &c. down to "search and revolve." But Particular Topics, he proceeds, are more to the purpose and of great value, and have not received the attention they deserve. He then goes on to explain at length what he means; repeating the observations in the next paragraph with some amplification and greater clearness, and then giving a specimen of the thing, in a series of Particular Topics or articles of inquiry concerning Heavy and Light; with which the chapter concludes. With regard to the importance of these *Topicæ* as a part of Bacon's method of inquiry — an importance so considerable that he meant to devote a special work to the subject, — see my prefaces to the *Parasceve* (Vol. I. p. 388.) and to the *Topica Inquisitionis de Luce et Lumine* (Vol. II. p. 315.).

much in the schools, (which is to be vainly subtile in a few things which are within their command, and to reject the rest,) I do receive particular Topics, that is places or directions of invention and inquiry in every particular knowledge, as things of great use; being mixtures of Logic with the matter of sciences; for in these it holdeth, *Ars inveniendi adolescit cum inventis*, [every act of discovery advances the art of discovery;] for as in going of a way we do not only gain that part of the way which is passed, but we gain the better sight of that part of the way which remaineth; so every degree of proceeding in a science giveth a light to that which followeth; which light if we strengthen, by drawing it forth into questions or places of inquiry, we do greatly advance our pursuit.

¶ [1] Now we pass unto the arts of Judgment, which handle the natures of Proofs and Demonstrations; which as to Induction hath a coincidence with Invention; *for in all inductions, whether in good or vicious form, the same action of the mind which inventeth, judgeth; all one as in the sense;* but otherwise it is in proof by syllogism; for the proof being not immediate but by mean, *the invention of the mean* is one thing, and the *judgment of the consequence* is another; the one exciting only, the other examining. Therefore for the real and exact form of judgment we refer ourselves to that which we have spoken of *Interpretation of Nature.*

For the other judgment by Syllogism, as it is a thing most agreeable to the mind of man, so it hath been vehemently and excellently laboured. For the nature of man doth extremely covet to have somewhat in his understanding fixed and immoveable, and as a rest and support of the mind. And therefore as Aristotle endeavoureth to prove that in all motion there is some point quiescent; and as he elegantly expoundeth the ancient fable of Atlas (that stood fixed and bare up the heaven from falling) to be meant of the poles or axle-tree of heaven, whereupon the conversion is accomplished; so assuredly men have a desire to have an Atlas or axle-tree within to keep them from fluctuation, which is like to a perpetual peril of falling; therefore men did hasten to set down some Principles about which the variety of their disputations might turn.

So then this art of Judgment is but *the reduction of propositions to principles in a middle term:* the Principles to be agreed

[1] De Aug. v. 4.

by all and exempted from argument; the Middle Term to be elected at the liberty of every man's invention; the Reduction to be of two kinds, direct and inverted; the one when the proposition is reduced to the principle, which they term a *Probation ostensive;* the other when the contradictory of the proposition is reduced to the contradictory of the principle, which is that which they call *per incommodum*, or *pressing an absurdity;* the number of middle terms to be[1] as the proposition standeth degrees more or less removed from the principle.

But this art hath two several methods of doctrine; the one by way of direction, the other by way of caution: the former frameth and setteth down a true form of consequence, by the variations and deflexions from which errors and inconsequences may be exactly judged; toward the composition and structure of which form, it is incident to handle the parts thereof, which are propositions, and the parts of propositions, which are simple words[2]; and this is that part of logic which is comprehended in the Analytics.

The second method of doctrine was introduced for expedite use and assurance sake; discovering the more subtile forms of sophisms and illaqueations with their redargutions, which is that which is termed *Elenches.* For although in the more gross sorts of fallacies it happeneth (as Seneca maketh the comparison well) as in juggling feats, which though we know not how they are done, yet we know well it is not as it seemeth to be; yet the more subtile sort of them doth not only put a man besides his answer, but doth many times abuse his judgment.

This part concerning *Elenches*[3] is excellently handled by Aristotle in precept, but more excellently by Plato in example, not only in the persons of the Sophists, but even in Socrates himself; who professing to affirm nothing, but to infirm that which was affirmed by another, hath exactly expressed all the forms of objection, fallace[4], and redargution. And although we

[1] *i. e.* to be more or fewer.

[2] This clause is omitted in the translation; and a new observation is introduced in its place; viz. that though this direction contains in itself a kind of Elenche or confutation (for the straight indicates the crooked), yet it is safest to employ Elenches (that is, Elenches properly so called) as monitors, for the better detection of fallacies by which the judgment would otherwise be ensnared.

[3] In the translation the Doctrine of Elenches is divided into three kinds—*Elenchos Sophismatum, Elenchos Hermeniæ, Elenchos imaginum sive Idolorum: i. e.* Cautions against Sophisms, against ambiguity of words, against Idols or false appearances; and it is to the first only that the observation which follows is applied.

[4] So in all the editions; and not (I think) a misprint for *fallacie*, but another word, formed not from *fallacia* but from *fallax*. Compare "Colours of Good and Evil," § 1. "The *fallax* of this colour," &c.

have said that the use of this doctrine is for redargution, yet it is manifest the degenerate and corrupt use is for caption and contradiction[1]; which passeth for a great faculty, and no doubt is of very great advantage: though the difference be good which was made between orators and sophisters, that the one is as the greyhound, which hath his advantage in the race, and the other as the hare, which hath her advantage in the turn, so as it is the advantage of the weaker creature.

But yet further, this doctrine of *Elenches* hath a more ample latitude and extent than is perceived; namely, unto divers parts of knowledge; whereof some are laboured and other omitted. For first, I conceive (though it may seem at first somewhat strange) that that part which is variably referred sometimes to Logic sometimes to Metaphysic, touching the *common adjuncts of essences*, is but an elenche[2]; for the great sophism of all sophisms being equivocation or ambiguity of words and phrase, specially of such words as are most general and intervene in every inquiry, it seemeth to me that the true and fruitful use (leaving vain subtilties and speculations) of the inquiry of majority, minority, priority, posteriority, identity, diversity, possibility, act, totality, parts, existence, privation, and the like, are but wise cautions against ambiguities of speech. So again the distribution of things into certain tribes, which we call categories or predicaments, are but cautions against the confusion of definitions and divisions.

Secondly, there is a seducement that worketh by the strength of the impression and not by the subtilty of the illaqueation; not so much perplexing the reason as overruling it by power of the imagination. But this part I think more proper to handle when I shall speak of Rhetoric.[3]

But lastly, there is yet a much more important and profound kind of fallacies in the mind of man, which I find not observed or enquired at all, and think good to place here, as that which of all others appertaineth most to rectify judgment: the force whereof is such, as it doth not dazzle or snare the understanding in some particulars, but doth more generally and inwardly infect and corrupt the state thereof.[4] For the mind of man is

[1] *i. e.* the true use is to answer sophistical arguments, the corrupt use to invent sophistical objections.

[2] This is the part which in the translation he calls *Elenchos Hermeniæ*; and explains much more clearly and fully.

[3] This paragraph is omitted altogether in the translation.

[4] Here we have the doctrine of Idols, in its earliest form; the names not being yet given, and the Idols of the Theatre not yet introduced into the company. For the

far from the nature of a clear and equal glass, wherein the beams of things should reflect according to their true incidence; nay, it is rather like an enchanted glass, full of superstition and imposture, if it be not delivered and reduced. For this purpose, let us consider the false appearances that are imposed upon us by the general nature of the mind [1], beholding them in an example or two; as first, in that instance which is the root of all superstition, namely, *That to the nature of the mind of all men it is consonant for the affirmative or active to affect more than the negative or privative:* so that a few times hitting or presence, countervails oft-times failing or absence [2]; as was well answered by Diagoras to him that shewed him in Neptune's temple the great number of pictures of such as had scaped shipwrack and had paid their vows to Neptune, saying, *Advise now, you that think it folly to invocate Neptune in tempest: Yea but* (saith Diagoras) *where are they painted that are drowned?* Let us behold it in another instance, namely, *That the spirit of man, being of an equal and uniform substance, doth usually suppose and feign in nature a greater equality and uniformity than is in truth.* Hence it cometh that the mathematicians cannot satisfy themselves, except they reduce the motions of the celestial bodies to perfect circles, rejecting spiral lines, and labouring to be discharged of eccentrics. Hence it cometh, that whereas there are many things in nature as it were *monodica* [3], *sui juris*, [singular, and like nothing but themselves;] yet the cogitations of man do feign unto them relatives, parallels, and conjugates, whereas no such thing is; as they have feigned an element of Fire, to keep square with Earth, Water, and Air, and the like: nay, it is not credible, till it be opened, what a number of fictions and fancies the similitude of human actions and arts [4], together with the making of man *communis mensura*, have brought into Natural Philosophy; not much

history of this doctrine see preface to the *Novum Organum*, note C. In the *De Augmentis* the names are given, and the fourth kind mentioned, though only to be set aside as not belonging to the present argument. The exposition of the three first is also considerably fuller than here, though not nearly so full as in the *Novum Organum*, to which we are referred.

[1] These are the Idols of the Tribe.

[2] which (he adds in the translation) is the root of all superstition and vain credulity, in matters of astrology, dreams, omens, &c.

[3] So the word is spelt throughout Bacon's writings, as observed by Mr. Ellis, Vol. I. p. 165. The introduction here of *sui juris* as the Latin equivalent seems to show that the error arose from a mistake as to the etymology of the Greek word.

[4] *i. e.* the supposed resemblance between the arts and actions of Man and the operations of Nature: *naturalium operationum ad similitudinem actionum humanarum reductio: hoc ipsum inquam, quod putetur talia Naturam facere qualia Homo facit.*

better than the heresy of the Anthropomorphites, bred in the cells of gross and solitary monks, and the opinion of Epicurus, answerable to the same in heathenism, who supposed the gods to be of human shape. And therefore Velleius the Epicurian [1] needed not to have asked, why God should have adorned the heavens with stars, as if he had been an Ædilis, one that should have set forth some magnificent shews or plays. For if that great work-master had been of an human disposition, he would have cast the stars into some pleasant and beautiful works and orders, like the frets in the roofs of houses; whereas one can scarce find a posture in square or triangle or straight line amongst such an infinite number; so differing an harmony there is between the spirit of Man and the spirit of Nature.

Let us consider again the false appearances imposed upon us by every man's own individual nature and custom [2], in that feigned supposition that Plato maketh of the cave: for certainly if a child were continued in a grot or cave under the earth until maturity of age, and came suddenly abroad, he would have strange and absurd imaginations; so in like manner, although our persons live in the view of heaven, yet our spirits are included in the caves of our own complexions and customs; which minister unto us infinite errors and vain opinions, if they be not recalled to examination.[3] But hereof we have given many examples in one of the errors, or peccant humours, which we ran briefly over in our first book.

And lastly, let us consider the false appearances that are imposed upon us by words [4], which are framed and applied according to the conceit and capacities of the vulgar sort: and although we think we govern our words, and prescribe it well, *Loquendum ut vulgus, sentiendum ut sapientes*, [a man should speak like the vulgar, and think like the wise;] yet certain it is that words, as a Tartar's bow, do shoot back upon the understanding of the wisest, and mightily entangle and pervert the judgment; so as it is almost necessary in all controversies and

[1] So in the original: the word being pronounced in Bacon's time *Epicúrian*. See *Walker on Shakespeare's versification*, p. 211.

[2] These are the Idols of the Cave.

[3] *i. e.* if they be not corrected by the continual contemplation of nature at large: *si e specu sua raro tantum et ad breve aliquod tempus prodeant, et non in contemplatione naturæ perpetuo, tanquam sub dio, morentur.*

It may be worth observing that Bacon guards himself against being supposed to represent the full intention of Plato's parable, by adding in a parenthesis *missa illa exquisita parabolæ subtilitate.*

[4] These are the Idols of the Market-place.

disputations to imitate the wisdom of the Mathematicians, in setting down in the very beginning the definitions of our words and terms, that others may know how we accept and understand them, and whether they concur with us or no.[1] For it cometh to pass for want of this, that we are sure to end there where we ought to have begun, which is in questions and differences about words. To conclude therefore, it must be confessed that it is not possible to divorce ourselves from these fallacies and false appearances, because they are inseparable from our nature and condition of life; so yet nevertheless the caution of them (for all elenches, as was said, are but cautions) doth extremely import the true conduct of human judgment. The particular elenches or cautions against these three false appearances I find altogether deficient.

Elenchi magni, sive de Idolis animi humani, nativis et adventitiis.

There remaineth one part of judgment of great excellency, which to mine understanding is so slightly touched, as I may report that also deficient; which is the application of the differing kinds of proofs to the differing kinds of subjects; for there being but four kinds of demonstrations, that is, by the immediate consent of the mind or sense; by induction; by sophism; and by congruity, which is that which Aristotle calleth *demonstration in orb or circle*, and not *a notioribus*[2]; every of these hath certain subjects in the matter of sciences, in which respectively they have chiefest use; and certain other, from which respectively they ought to be excluded: and the rigour and curiosity in requiring the more severe proofs in some things, and chiefly the facility in contenting ourselves with the more remiss proofs in others, hath been amongst the greatest causes of detriment and hindrance to knowledge. The distributions and assignations of demonstrations, according to the analogy of sciences, I note as deficient.

De Analogia Demonstrationum.

¶[3] The custody or retaining of knowledge is either in Writing or Memory; whereof Writing hath two parts, the nature of the *character*, and the order of the *entry*. For the art of *characters*, or other visible notes of words or things, it hath nearest conjuga-

[1] It might seem from this that Bacon thought the premising of definitions would be a sufficient remedy for the evil. But in the translation he changes the sentence and expressly warns us that it is not: for the definitions themselves, he says, are made of *words*; and though we think to remove ambiguities by the use of technical terms, &c., yet all is not enough, and we must look for a remedy which goes deeper.

[2] *non a notioribus scilicet, sed tanquam de plano.*—De Aug.

[3] De Aug. v. 5.

tion with grammar, and therefore I refer it to the due place.[1] For the *disposition* and *collocation* of that knowledge which we preserve in writing, it consisteth in a good digest of common-places; wherein I am not ignorant of the prejudice imputed to the use of common-place books, as causing a retardation of reading, and some sloth or relaxation of memory. But because it is but a counterfeit thing in knowledges to be forward and pregnant, except a man be deep and full, I hold the entry of common-places to be a matter of great use and essence in studying; as that which assureth copie of invention, and contracteth judgment to a strength. But this is true, that of the *methods* of common-places that I have seen, there is none of any sufficient worth; all of them carrying merely the face of a *school*, and not of a *world*; and referring to vulgar matters and pedantical divisions without all life or respect to action.

For the other principal part of the custody of knowledge, which is Memory, I find that faculty in my judgment weakly enquired of. An art there is extant of it; but it seemeth to me that there are better precepts than that art, and better practices of that art than those received. It is certain the art (as it is) may be raised to points of ostentation prodigious: but in use (as it is now managed) it is barren; not burdensome nor dangerous to natural memory, as is imagined, but barren; that is, not dexterous to be applied to the serious use of business and occasions. And therefore I make no more estimation of repeating a great number of names or words upon once hearing, or the pouring forth of a number of verses or rhymes *ex tempore*, or the making of a satirical simile of every thing, or the turning of every thing to a jest, or the falsifying or contradicting of every thing by cavil, or the like, (whereof in the faculties of the mind there is great copie, and such as by device and practice may be exalted to an extreme degree of wonder,) than I do of the tricks of tumblers, funambuloes, baladines; the one being the same in the mind that the other is in the body; matters of strangeness without worthiness.

This art of Memory is but built upon two intentions; the

[1] All this is omitted in the translation. The art of retaining knowledge is divided into two doctrines: viz. concerning the helps (*adminicula*) of memory, and concerning Memory itself. The only help of memory which is mentioned is writing; concerning which, after remarking that without this help the memory cannot be trusted to deal with matters of length and requiring exactness, especially such as the interpretation of nature, he insists upon the value of a good digest of common-places even in the old and popular sciences, and so proceeds as in the text.

one Prenotion, the other Emblem. Prenotion dischargeth the indefinite seeking of that we would remember, and directeth us to seek in a narrow compass; that is, somewhat that hath congruity with our *place of memory*. Emblem reduceth conceits intellectual to images sensible, which strike the memory more; out of which axioms may be drawn much better practique than that in use; and besides which axioms, there are divers moe touching help of memory, not inferior to them.[1] But I did in the beginning distinguish, not to report those things deficient, which are but only ill managed.

¶[2] There remaineth the fourth kind of Rational Knowledge, which is transitive, concerning the expressing or transferring our knowledge to others; which I will term by the general name of Tradition or Delivery. Tradition hath three parts; the first concerning the *organ* of tradition; the second concerning the *method* of tradition; and the third concerning the *illustration* of tradition.[3]

For the organ of tradition, it is either Speech or Writing: for Aristotle saith well, *Words are the images of cogitations, and letters are the images of words;* but yet it is not of necessity that cogitations be expressed by the medium of words. For *whatsoever is capable of sufficient differences*[4], *and those perceptible by the sense, is in nature competent to express*[5] *cogitations.* And therefore we see in the commerce of barbarous[6] people that understand not one another's language, and in the practice of divers that are dumb and deaf, that men's minds are expressed in gestures, though not exactly, yet to serve the turn. And we understand further[7] that it is the use of China and the kingdoms of the high Levant to write in Characters Real, which express neither letters nor words in gross, but Things or Notions; insomuch as countries and provinces, which understand not one another's language, can nevertheless read one another's writings, because the characters are accepted more

[1] The nature and use of these prænotions and emblems is explained and illustrated in the translation by several examples; but the substance of the observation is not altered.

[2] De Aug. vi. 1.

[3] In the *De Augmentis*, *tradition* (in these three last cases) is translated *sermo*: which appears to be used in the general sense of *communication*.

[4] *i. e.* sufficient to explain the variety of notions.

[5] *i. e.* to convey the cogitations of one man to another (*fiere posse vehiculum cogitationum de homine in hominem*), and so to be an organ of *tradition* (*traditivæ*).

[6] *Barbarous* is omitted in the translation: the thing being equally seen in civilised people who know no common language.

[7] *notissimum fieri jam cœpit.*

generally than the languages do extend; and therefore they have a vast multitude of characters; as many, I suppose, as radical words.[1]

These Notes of Cogitations are of two sorts; the one when the note hath some similitude or congruity with the notion; the other *ad placitum*, having force only by contract or acceptation. Of the former sort are Hieroglyphics and Gestures. For as to Hieroglyphics, (things of ancient use, and embraced chiefly by the Ægyptians, one of the most ancient nations,) they are but as continued impresses and emblems. And as for Gestures, they are as transitory Hieroglyphics, and are to Hieroglyphics as words spoken are to words written, in that they abide not; but they have evermore, as well as the other, an affinity with the things signified: as Periander, being consulted with how to preserve a tyranny newly usurped, bid the messenger attend and report what he saw him do; and went into his garden and topped all the highest flowers; signifying, that it consisted in the cutting off and keeping low of the nobility and *grandes*.[2] *Ad placitum* are the Characters Real before mentioned, and Words: although some have been willing by curious inquiry, or rather by apt feigning, to have derived imposition of names from reason and intendment; a speculation elegant, and, by reason it searcheth into antiquity, reverent; but sparingly mixed with truth, and of small fruit.[3]

De Notis Rerum. This portion of knowledge, touching the Notes of Things and cogitations in general, I find not enquired, but deficient. And although it may seem of no great use, considering that words and writings by letters do far excel all the other ways; yet because this part concerneth as it were the mint of knowledge, (for words are the tokens current and accepted for conceits, as moneys are for values, and that it is fit men be not ignorant that moneys may be of another kind than gold and silver,) I thought good to propound it to better enquiry.

Concerning Speech and Words, the consideration of them hath produced the science of Grammar: for man still striveth to

[1] This observation is transferred in the *De Augmentis* to the next paragraph, and applied generally to all systems of writing in Characters Real.

[2] So in the original; and I believe always in Bacon; the Spanish word being still treated as a foreigner, and the accent falling no doubt upon the first syllable.

[3] The substance of this remark is introduced in the translation in another place. Here it is merely said that Characters Real have nothing emblematic in them; but are merely *surds*, framed *ad placitum* and silently agreed upon by custom.

reintegrate himself in those benedictions, from which by his fault he hath been deprived; and as he hath striven against the first general curse by the invention of all other arts, so hath he sought to come forth of the second general curse (which was the confusion of tongues) by the art of Grammar: whereof the use in a mother[1] tongue is small; in a foreign tongue more; but most in such foreign tongues as have ceased to be vulgar tongues, and are turned only to learned tongues. The duty of it is of two natures; the one popular[2], which is for the speedy and perfect attaining languages, as well for intercourse of speech as for understanding of authors; the other philosophical, examining the power and nature of words as they are the footsteps and prints of reason: which kind of analogy between words and reason is handled *sparsim*, brokenly, though not entirely[3]; and therefore I cannot report it deficient, though I think it very worthy to be reduced into a science by itself.

Unto Grammar also belongeth, as an appendix, the consideration of the Accidents of Words; which are measure, sound, and elevation or accent, and the sweetness and harshness of them; whence hath issued some curious observations in Rhetoric, but chiefly Poesy, as we consider it in respect of the verse and not of the argument: wherein though men in learned tongues do tie themselves to the ancient measures, yet in modern languages it seemeth to me as free to make new measures of verses as of dances; for a dance is a measured pace, as a verse is a measured speech.[4] In these things the sense is better judge than the art;

[1] *in another tongue* ed. 1605: *in mother tongue* edd. 1629 and 1633. The translation has *in linguis quibusque vernaculis.*

[2] In the translation he substitutes *literary* for *popular.*

[3] Here are introduced in the translation some interesting remarks on the subject of the analogy between words and reason; in which it is worth observing among other things, that Bacon appears to have changed his opinion as to the nature of Cæsar's book *De Analogia*, since he wrote the first book of the *Advancement.* See above p. 311. There he describes it as "a grammatical philosophy, wherein he did labour to make this same *vox ad placitum* to become *vox ad licitum*, and to reduce custom of speech to congruity of speech, and took as it were the picture of words from the life of reason." Here he says he has doubted whether that book of Cæsar's treated of such a grammatical philosophy as he is speaking of; but that he rather suspects it contained nothing very high or subtile, but only precepts for the formation of a chaste and perfect style, free from vulgarity and affectation.

[4] This observation is omitted in the translation, and instead we have a censure of the attempts (made not long before Bacon's time) to force the modern languages into the ancient measures; measures (he says) which are incompatible with the frame of the languages themselves, and not less offensive to the ear. But this censure may perhaps be considered as a developement of the remark which concludes this para-

Cœnæ fercula nostræ
Mallem convivis quam placuisse cocis:

[the dinner is to please the guests that eat it, not the cook that dresses it.] And of the servile expressing antiquity in an unlike and an unfit subject, it is well said, *Quod tempore antiquum videtur, id incongruitate est maxime novum;* [there is nothing more new than an old thing that has ceased to fit].

For Ciphers, they are commonly in letters or alphabets, but may be in words. The kinds of Ciphers (besides the simple ciphers with changes and intermixtures of nulls and non-significants) are many, according to the nature or rule of the infolding; Wheel-ciphers, Key-ciphers, Doubles, &c. But the virtues of them, whereby they are to be preferred, are three; that they be not laborious to write and read; that they be impossible to decipher; and, in some cases, that they be without suspicion. The highest degree whereof is to write *omnia per omnia;* which is undoubtedly possible, with a proportion quintuple at most of the writing infolding to the writing infolded, and no other restraint whatsoever.[1] This art of Ciphering, hath for relative an art of Disciphering; by supposition[2] unprofitable; but, as things are, of great use. For suppose that ciphers were well managed, there be multitudes of them which exclude the discipherer. But in regard of the rawness and unskilfulness of the hands through which they pass, the greatest matters are many times carried in the weakest ciphers.

In the enumeration of these private and retired arts, it may be thought I seek to make a great muster-roll of sciences; naming them for shew and ostentation, and to little other purpose. But let those which are skilful in them judge whether I bring them in only for appearance, or whether in that which I speak of them (though in few marks) there be not some seed

graph, and which is also omitted. Certainly there is no English metre which represents the metrical effect of the Virgilian hexameter worse than the English hexameter as people write it now: and if any one would try to write it so as to represent the metrical effect truly, by attending to the distinction between accent and quantity, and distributing them according to the same laws, he would find the truth of Bacon's remark that *ipsæ linguæ fabrica respuit;* the English language does not supply the materials.

[1] In the *De Augmentis* he gives a specimen of a cipher by which this feat of writing *omnia per omnia* (that is of conveying any words you please under cover of any other words you please, provided only that they contain not less than five times as many letters) may be accomplished; a cipher invented, he says, by himself when he was at Paris.

[2] *i. e.* if things were as they might be: *attamen præcautione solerti fieri possit inutilis.*

of proficience. And this must be remembered, that as there be many of great account in their countries and provinces, which when they come up to the Seat of the Estate are but of mean rank and scarcely regarded; so these arts being here placed with the principal and supreme sciences, seem petty things; yet to such as have chosen them to spend their studies in them[1], they seem great matters.

¶ [2] For the Method of Tradition, I see it hath moved a controversy in our time.[3] But as in civil business, if there be a meeting and men fall at words there is commonly an end of the matter for that time and no proceeding at all; so in learning, where there is much controversy there is many times little inquiry. For this part of knowledge of Method seemeth to me so weakly enquired as I shall report it deficient.

Method hath been placed, and that not amiss, in Logic, as a part of Judgment: for as the doctrine of Syllogisms comprehendeth the rules of judgment upon that which is invented, so the doctrine of Method containeth the rules of judgment upon that which is to be delivered; for judgment precedeth Delivery, as it followeth Invention.[4] Neither is the method or the nature of the tradition material only to the *use* of knowledge, but likewise to the *progression* of knowledge: for since the labour and life of one man cannot attain to perfection of knowledge, the wisdom of the Tradition is that which inspireth the felicity of continuance and proceeding. And therefore the most real diversity of method is of method referred to Use, and method referred to Progression; whereof the one may be termed Magistral, and the other of Probation.[5]

The later whereof seemeth to be *via deserta et interclusa*, [a way that is abandoned and stopped up]. For as knowledges are now delivered, there is a kind of contract of error between

[1] *qui operam illis præcipue impenderint.* — De Aug. The original edition and that of 1629 have "to spend their labours studies in them," — which is also the reading of the edition 1633, except that it has a comma after "labours." "Labours and studies" is the reading of modern editions; but I think it is more likely that one of the words was meant to be substituted for the other.

[2] De Aug. vi. 2.

[3] Besides Ramus himself and Carpentier, one of the principal persons in this controversy was the Cardinal D'Ossat, of whom some account will be found in De Thou's memoirs.— *R. L. E.*

[4] So edd. 1629 and 1633. The original has *Inventions.*

[5] Called *Initiativa* in the translation; and explained to mean the method which discloses the inner mysteries of science; and distinguished from the other not as more secret but as more profound; the one announcing the results of enquiry, the other exhibiting the method and process which led to them.

the deliverer and the receiver: for he that delivereth knowledge desireth to deliver it in such form as may be best believed, and not as may be best examined; and he that receiveth knowledge desireth rather present satisfaction than expectant inquiry; and so rather not to doubt than not to err: glory making the author not to lay open his weakness, and sloth making the disciple not to know his strength.

But knowledge that is delivered as a thread to be spun on, ought to be delivered and intimated[1], if it were possible, *in the same method wherein it was invented;* and so is it possible of knowledge induced. But in this same anticipated and prevented knowledge, no man knoweth how he came to the knowledge which he hath obtained. But yet nevertheless, *secundum majus et minus*, a man may revisit and descend unto the foundations of his knowledge and consent; and so transplant it into another as it grew in his own mind. For it is in knowledges as it is in plants: if you mean to use the plant, it is no matter for the roots; but if you mean to remove it to grow, then it is more assured to rest upon roots than slips. So the delivery of knowledges (as it is now used) is as of fair bodies of trees without the roots; good for the carpenter, but not for the planter; but if you will have sciences grow, it is less matter for the shaft or body of the tree, so you look well to the taking up of the roots. Of which kind of delivery the method of the mathematiques, in that subject, hath some shadow; but generally I see it neither put in ure nor put in inquisition, and therefore note it for deficient.

De Methodo sincera, sive ad filios Scientiarum.[2]

Another diversity of Method there is, which hath some affinity with the former, used in some cases by the discretion of the ancients, but disgraced since by the impostures of many vain persons, who have made it as a false light for their counterfeit merchandises; and that is, Enigmatical and Disclosed.[3]

[1] So in all the editions; but probably a misprint for *insinuated*. The translation has *insinuanda*.

[2] In the translation he gives it the additional name of *Traditio Lampadis*; alluding to the transmission of the lighted torch from one to another in the Greek torch-race. See Preface to *Nov. Org.* p. 87. note.

[3] In the translation he calls the latter *exoterica*, the former *acroamatica*; and explains that the affinity between the *acroamatica* and the *initiativa* lies in this only — that each addresses itself to a select audience; for in themselves (*re ipsa*) they are opposite; the *initiativa* adopting a method of delivery more open than ordinary; the *acroamatica*, one more obscure; the "vulgar capacities" being excluded in the one case by the necessary subtilty of the argument, in the other by an affected obscurity in the exposition. Concerning the latter method, see Preface to the *Novum Organum*, note B.

The pretence whereof[1] is to remove the vulgar capacities from being admitted to the secrets of knowledges, and to reserve them to selected auditors, or wits of such sharpness as can pierce the veil.

Another diversity of Method, whereof the consequence is great, is the delivery of knowledge in Aphorisms, or in Methods; wherein we may observe that it hath been too much taken into custom, out of a few Axioms or observations upon any subject to make a solemn and formal art; filling it with some discourses, and illustrating it with examples, and digesting it into a sensible Method; but the writing in Aphorisms hath many excellent virtues, whereto the writing in Method doth not approach.

For first, it trieth the writer, whether he be superficial or solid: for Aphorisms, except they should be ridiculous, cannot be made but of the pith and heart of sciences; for discourse of illustration is cut off; recitals of examples are cut off; discourse of connexion and order is cut off; descriptions of practice are cut off; so there remaineth nothing to fill the Aphorisms but some good quantity of observation: and therefore no man can suffice, nor in reason will attempt, to write Aphorisms, but he that is sound and grounded. But in Methods,

> Tantum series juncturaque pollet,
> Tantum de medio sumptis accedit honoris,

[the arrangement and connexion and joining of the parts has so much effect,] as a man shall make a great shew of an art, which if it were disjointed would come to little. Secondly, Methods are more fit to win consent or belief, but less fit to point to action; for they carry a kind of demonstration in orb or circle, one part illuminating another, and therefore satisfy; but particulars, being dispersed, do best agree with dispersed directions. And lastly, Aphorisms, representing a knowledge broken, do invite men to enquire farther; whereas Methods, carrying the shew of a total, do secure men, as if they were at furthest.

Another diversity of Method, which is likewise of great weight, is the handling of knowledge by Assertions and their Proofs, or by Questions and their Determinations; the latter kind whereof, if it be immoderately followed, is as prejudicial to the proceeding of learning, as it is to the proceeding

[1] *i. e.* of the enigmatical method.

of an army to go about to besiege every little fort or hold. For if the field be kept and the sum of the enterprise pursued, those smaller things will come in of themselves: indeed[1] a man would not leave some important piece enemy at his back. In like manner, the use of confutation in the delivery of sciences ought to be very sparing; and to serve to remove strong preoccupations and prejudgments, and not to minister and excite disputations and doubts.

Another diversity of Methods is *according to the subject or matter which is handled;* for there is a great difference in delivery of the Mathematics, which are the most abstracted of knowledges, and Policy, which is the most immersed: and howsoever contention hath been moved touching an uniformity of method in multiformity of matter, yet we see how that opinion, besides the weakness of it, hath been of ill desert towards learning, as that which taketh the way to reduce learning to certain empty and barren generalities; being but the very husks and shells of sciences, all the kernel being forced out and expulsed with the torture and press of the method[2]; and therefore as I did allow well of particular Topics for invention, so I do allow likewise of particular Methods of tradition.

Another diversity of judgment[3] in the delivery and teaching of knowledge is *according unto the light and presuppositions of that which is delivered;* for that knowledge which is new and foreign from opinions received, is to be delivered in another form than that that is agreeable[4] and familiar; and therefore Aristotle, when he thinks to tax Democritus, doth in truth commend him, where he saith, *If we shall indeed dispute, and not follow after similitudes,* &c. For those whose conceits are seated in popular opinions, need only but to prove or dispute; but those whose conceits are beyond popular opinions, have a double labour; the one to make themselves conceived, and the other to prove and demonstrate; so that it is of necessity with

[1] *i. e.* "although indeed:" (*illud tamen inficias non iverim,* &c.)

[2] This observation is introduced in the translation at the beginning of the chapter, and applied particularly to the method of *dichotomies;* which are not mentioned, I think, by name in the *Advancement.*

[3] *i. e.* a diversity of method to be used with judgment. (*Sequitur aliud methodi discrimen in tradendis scientiis cum judicio adhibendum.*) This may perhaps be an error of the press or of the transcriber, some words having accidentally dropped out. It may however be merely an effect of hasty composition, of which there are many evidences in this part of the work.

[4] *i. e.* in accordance with received opinions. (*Opinionibus jam pridem imbibitis et receptis affinis.*)

them to have recourse to similitudes and translations to express themselves. And therefore in the infancy of learning, and in rude times, when those conceits which are now trivial were then new, the world was full of Parables and Similitudes; for else would men either have passed over without mark or else rejected for paradoxes that which was offered, before they had understood or judged. So in divine learning we see how frequent Parables and Tropes are[1]: for it is a rule, *That whatsoever science is not consonant to presuppositions, must pray in aid of similitudes.*

There be also other diversities of Methods, vulgar and received; as that of Resolution or Analysis, of Constitution or Systasis, of Concealment or Cryptic[2], &c. which I do allow well of; though I have stood upon those which are least handled and observed. All which I have remembered to this purpose, because I would erect and constitute one general inquiry, which seems to me deficient, touching the Wisdom of Tradition. *De prudentia Traditionis.*

But unto this part of knowledge concerning Method doth further belong not only the Architecture of the whole frame of a work, but also the several beams and columns thereof; not as to their stuff, but as to their quantity and figure; and therefore Method considereth not only the disposition of the Argument or Subject, but likewise the Propositions; not as to their truth or matter, but as to their limitation and manner. For herein Ramus merited better a great deal in reviving the good rules of Propositions, Καθόλου πρῶτον, κατὰ παντός, &c.[3] than he did in introducing the canker of Epitomes[4]; and yet (as it is the condition of human things that, according to the ancient fables, *The most precious things have the most pernicious keepers;*) it was so, that the attempt of the one made him fall upon the other.[5] For he had need be well conducted that should design to make Axioms *convertible*, if he make them not withal *circular*, and *non-promovent*, or *incurring into themselves*: but yet the intention was excellent.

[1] This allusion to divine learning is omitted in the translation.

[2] In the translation he adds *Diæretica* and *Homerica*, and observes that he does not dwell upon these because they have been rightly invented and distributed.

[3] That they should be true generally, primarily, and essentially.— *R. L. E.*

[4] Instead of "the canker of Epitomes," the translation substitutes "his peculiar method and dichotomies."

[5] The attempt to amend propositions cast him upon those epitomes and shallows of knowledge, as they are called in the translation — *epitomas illas et scientiarum vada.*

The other considerations of Method concerning Propositions are chiefly touching the utmost propositions, which limit the dimensions of sciences; for every knowledge may be fitly said, besides the profundity, (which is the truth and substance of it, that makes it solid,) to have a longitude and a latitude; accounting the latitude towards other sciences, and the longitude towards action; that is, from the greatest generality to the most particular precept: the one giveth rule how far one knowledge ought to intermeddle within the province of another, which is the rule they call Καθαντὸ[1]; the other giveth rule unto what degree of particularity a knowledge should descend: which latter I find passed over in silence, being in my judgment the more material; for certainly there must be somewhat left to practice[2]; but how much is worthy the inquiry. We see remote and superficial generalities do but offer knowledge to scorn of practical men; and are no more aiding to practice, than an Ortelius' universal map is to direct the way between London and York. The better sort of rules have been not unfitly compared to glasses of steel unpolished, where you may see the images of things, but first they must be filed: so the rules will help, if they be laboured and polished by practice. *De productione Axiomatum.* But how chrystalline they may be made at the first, and how far forth they may be polished aforehand, is the question; the inquiry whereof seemeth to me deficient.

There hath been also laboured and put in practice a method, which is not a lawful method, but a method of imposture; which is to deliver knowledges in such manner, as men may speedily come to make a shew of learning who have it not: such was the travail of Raymundus Lullius, in making that art which bears his name; not unlike to some books of Typocosmy which have been made since; being nothing but a mass of words of all arts, to give men countenance that those which use the terms might be thought to understand the art; which collections are much like a fripper's or broker's shop, that hath ends of every thing, but nothing of worth.

¶[3] Now we descend to that part which concerneth the Illus-

[1] This is omitted in the translation. "The rule they call καθαντὸ" is the rule that propositions should be true *essentially*.

[2] For we must not fall into the error of Antoninus Pius (he adds in the translation) — to become *Cymini Sectores*, multiplying divisions to the last degree of minuteness.

[3] De Aug. vi. 3.

tration of Tradition, comprehended in that science which we call Rhetoric, or Art of Eloquence; a science excellent, and excellently well laboured. For although in true value it is inferior to wisdom, as it is said by God to Moses, when he disabled himself for want of this faculty, *Aaron shall be thy speaker, and thou shalt be to him as God;* yet with people it is the more mighty: for so Salomon saith, *Sapiens corde appellabitur prudens, sed dulcis eloquio majora reperiet,* [the wise in heart shall be called prudent, but he that is sweet of speech shall compass greater things;] signifying that profoundness of wisdom will help a man to a name or admiration, but that it is eloquence that prevaileth in an active life. And as to the labouring of it, the emulation of Aristotle with the rhetoricians of his time, and the experience of Cicero, hath made them in their works of Rhetorics exceed themselves. Again, the excellency of examples of eloquence in the orations of Demosthenes and Cicero, added to the perfection of the precepts of eloquence, hath doubled the progression in this art; and therefore the deficiences which I shall note will rather be in some collections which may as handmaids attend the art, than in the rules or use of the art itself.

Notwithstanding, to stir the earth a little about the roots of this science, as we have done of the rest: The duty and office of Rhetoric is *to apply Reason to Imagination*[1] for the better moving of the will. For we see Reason is disturbed in the administration thereof by three means; by Illaqueation or Sophism, which pertains to Logic; by Imagination or Impression[2], which pertains to Rhetoric; and by Passion or Affection, which pertains to Morality.[3] And as in negotiation with others men are wrought by cunning, by importunity, and by vehemency; so in this negotiation within ourselves men are undermined by Inconsequences, solicited and importuned by Impressions or Observations, and transported by Passions. Neither is the nature of man so unfortunately built, as that those powers and arts should have force to disturb reason, and not to establish and advance it: for the end of Logic is to teach a form of argument to secure reason, and not to entrap it; the end of

[1] Rhetoric being to the Imagination what Logic is to the Understanding.—*De Aug.*

[2] In the translation he substitutes *per præstigias verborum;* false impressions produced by words on the imagination.

[3] *i. e.* moral philosophy. (*Ethica.*)

Morality is to procure the affections to obey [1] reason, and not to invade it; the end of Rhetoric is to fill the imagination to second reason, and not to oppress it: for these abuses of arts come in but *ex obliquo*, for caution.

And therefore it was great injustice in Plato, though springing out of a just hatred of the rhetoricians of his time, to esteem of Rhetoric but as a voluptuary art, resembling it to cookery, that did mar wholesome meats, and help unwholesome by variety of sauces to the pleasure of the taste. For we see that speech is much more conversant in adorning that which is good than in colouring that which is evil; for there is no man but speaketh more honestly than he can do or think: and it was excellently noted by Thucydides in Cleon [2], that because he used to hold on the bad side in causes of estate, therefore he was ever inveighing against eloquence and good speech; knowing that no man can speak fair of courses sordid and base. And therefore as Plato said elegantly, *That virtue, if she could be seen, would move great love and affection;* so seeing that she cannot be shewed to the Sense by corporal shape, the next degree is to shew her to the Imagination in lively representation: for to shew her to Reason only in subtilty of argument, was a thing ever derided in Chrysippus and many of the Stoics; who thought to thrust virtue upon men by sharp disputations and conclusions, which have no sympathy with the will of man.

Again, if the affections in themselves were pliant and obedient to reason, it were true there should be no great use of persuasions and insinuations to the will, more than of naked proposition and proofs; but in regard of the continual mutinies and seditions of the affections,

> Video meliora, proboque;
> Deteriora sequor:

[whereby they who not only see the better course, but approve it also, nevertheless follow the worse,] reason would become captive and servile, if Eloquence of Persuasions did not practise and win the Imagination from the Affection's part, and contract a confederacy between the Reason and Imagination against the Affections. For the affections themselves carry ever an ap-

[1] In the translation he says *ut rationi militent*; to fight on the side of reason.

[2] In the translation he says, more correctly, "it was noted by Thucydides *as a censure passed upon Cleon*" (*tale quidpiam solitum fuisse objici Cleoni*); for the observation is made by Diodotus in his answer to Cleon's speech, iii. 42.

petite to good, as reason doth; the difference is, that *the affection beholdeth merely the present; reason beholdeth the future and sum of time;* and therefore the present filling the imagination more, reason is commonly vanquished; but after that force of eloquence and persuasion hath made things future and remote appear as present, then upon the revolt of the imagination reason prevaileth.

We conclude therefore, that Rhetoric can be no more charged with the colouring of the worse part, than Logic with Sophistry, or Morality with Vice.[1] For we know the doctrines of contraries are the same, though the use be opposite. It appeareth also that Logic differeth from Rhetoric, not only as the fist from the palm, the one close the other at large; but much more in this, that Logic handleth reason exact and in truth, and Rhetoric handleth it as it is planted in popular opinions and manners. And therefore Aristotle doth wisely place Rhetoric as between Logic on the one side and moral or civil knowledge on the other, as participating of both: for the proofs and demonstrations of Logic are toward all men indifferent and the same; but the proofs and persuasions of Rhetoric ought to differ according to the auditors:

Orpheus in sylvis, inter delphinas Arion:

[to be in the woods an Orpheus, among the dolphins an Arion:] which application, in perfection of idea, ought to extend so far, that if a man should speak of the same thing to several persons, he should speak to them all respectively and several ways: though this *politic part of eloquence in private speech* it is easy for the greatest orators to want, whilst by the observing their well-graced forms of speech they leese the volubility of application: and therefore it shall not be amiss to recommend this to better inquiry[2]; not being curious whether we place it here, or in that part which concerneth policy. *De prudentia Sermonis privati.*

[1] The last clause is omitted in the translation. I do not know why. For according to Bacon's doctrine, expounded originally in the *Meditationes Sacræ* upon the text *non accipit stultus verba prudentiæ nisi ea dixeris quæ versantur in corde ejus*, and repeated here a little further on, — namely, that a man can neither protect his own virtue against evil arts, nor reclaim others from vice, without the help of the knowledge of evil, — Morality has a relation to Vice exactly corresponding with that of Logic to Sophistry; unless it be maintained that the Logician ought to be prepared to practice Sophistry as well as to detect and defeat it.

[2] Being a thing which the more it is considered the more it will be valued (*rem certe quam quo attentius quis recogitet, eo pluris faciet*).

Now therefore will I descend to the deficiences, which (as I said) are but attendances[1]: and first, I do not find the wisdom and diligence of Aristotle well pursued, who began to make a collection of *the popular signs and colours of good and evil, both simple and comparative,* which are as the Sophisms of Rhetoric (as I touched before). For example:

Colores boni et mali, simplicis et comparati.

SOPHISMA.

Quod laudatur, bonum: quod vituperatur, malum.

REDARGUTIO.

Laudat venales qui vult extrudere merces.
Malum est, malum est, inquit emptor: sed cum recesserit, tum gloriabitur.[2]

The defects in the labour of Aristotle are three: one, that there be but a few of many; another, that their Elenches are not annexed[3]: and the third, that he conceived but a part of the use of them: for their use is not only in probation, but much more in impression. For many forms are equal in signification which are differing in impression; as the difference is great in the piercing of that which is sharp and that which is flat, though the strength of the percussion be the same; for there is no man but will be a little more raised by hearing it said, *Your enemies will be glad of this:*

Hoc Ithacus velit, et magno mercentur Atridæ:

than by hearing it said only, *This is evil for you.*

Secondly, I do resume also that which I mentioned before touching Provision or Preparatory store for the furniture of speech and readiness of invention; which appeareth to be of two sorts; the one in resemblance to a shop of pieces unmade up, the other to a shop of things ready made up; both to be applied to that which is frequent and most in request:

[1] and which are all of the nature of collections for store (*pertinent omnia ad promptuariam*).

[2] Sophism.—That which people praise is good, that which they blame is bad.
Elenche.—He praises his wares who wants to get them off his hands.
It is naught, it is naught, sayth the buyer; but when he is gone he will vaunt.

[3] In the translation, instead of the single example given above, he inserts a collection of twelve, by way of specimen; each having the elenche annexed and completely explained. This collection is a translation, with corrections and additions, of the English tract entitled "Colours of Good and Evil," which was printed along with the Essays in 1597, and will be found in this edition among the literary works.

the former of these I will call *Antitheta*, and the latter *Formulæ*.

Antitheta are Theses argued *pro et contra;* wherein men may be more large and laborious: but (in such as are able to do it) to avoid prolixity of entry, I wish the seeds of the several arguments to be cast up into some brief and acute sentences; not to be cited, but to be as skeins or bottoms of thread, to be unwinded at large when they come to be used; supplying authorities and examples by reference. *Antitheta Rerum.*

PRO VERBIS LEGIS.

Non est interpretatio, sed divinatio, quæ recedit a literâ.
Cum receditur a literâ, judex transit in legislatorem.

PRO SENTENTIA LEGIS.

Ex omnibus verbis est eliciendus sensus qui interpretatur singula.[1]

Formulæ are but decent and apt passages or conveyances of speech, which may serve indifferently for differing subjects; as of preface, conclusion, digression, transition, excusation, &c. For as in buildings there is great pleasure and use in the well-casting of the stair-cases, entries, doors, windows, and the like; so in speech the conveyances and passages are of special ornament and effect.

A CONCLUSION IN A DELIBERATIVE.

So may we redeem the faults passed, and prevent the inconveniences future.

¶[3] There remain two appendices touching the tradition of knowledge, the one Critical, the other Pedantical.[4] For all knowledge is either delivered by teachers, or attained by men's proper endeavours: and therefore as the principal part of tradi-

[1] For the Words of the Law. — Interpretation which departs from the letter, is not interpretation but divination.

When the letter is departed from the Judge becomes the Lawgiver.

For the Intention of the Law.—The sense according to which each word is to be interpreted must be collected from all the words together.

Of these *antitheta* a large collection will be found in the *De Augmentis*, set forth by way of specimen in the manner here recommended.

[2] Of these *formulæ* — or *formulæ minores* as he afterwards called them — three other examples are given in the *De Augmentis*, all from Cicero. Bacon's own speeches and narrative writings would supply many very good ones.

[3] De Aug. vi. 4.

[4] *Pædagogica*, in the translation.

tion of knowledge concerneth chiefly writing [1] of books, so the relative part thereof concerneth reading of books. Whereunto appertain incidently these considerations. The first is concerning the true correction and edition of authors; wherein nevertheless rash diligence hath done great prejudice. For these critics have often presumed that that which they understand not is false set down: as the Priest that where he found it written of St. Paul, *Demissus est per sportam*, [he was let down in a basket,] mended his book, and made it *Demissus est per portam*, [he was let out by the gate;] because *sporta* was an hard word, and out of his reading [2]; and surely their errors, though they be not so palpable and ridiculous, are yet of the same kind. And therefore as it hath been wisely noted, the most corrected copies are commonly the least correct.

The second is concerning the exposition and explication of authors, which resteth in annotations and commentaries; wherein it is over usual to blanch the obscure places, and discourse upon the plain.

The third is concerning the times, which in many cases give great light to true interpretations.[3]

The fourth is concerning some brief censure and judgment of the authors; that men thereby may make some election unto themselves what books to read.

And the fifth is concerning the syntax and disposition of

[1] *in writing*, in the original; and also in the editions 1629 and 1633. The translation has *in lectione librorum consistit.*

[2] For this illustration, which as reflecting upon a Priest might have been offensive at Rome, another is substituted in the *De Augmentis*, which is "not so palpable and ridiculous." A striking instance of the same kind occurs in two recent editions of this very work. In an edition of the *Advancement of Learning*, published by J. W. Parker in 1852, *Orosius* is substituted for *Osorius* in the passage (p. 283.), "Then grew the flowing and watery vein of Osorius, the Portugal Bishop, to be in price;" with the following note: "All the editions have *Osorius*, which however must be a mere misprint. He was not a Portuguese, but a Spaniard, born at Tarragona, nor indeed ever a bishop. He was sent by St. Augustine on a mission to Jerusalem, and is supposed to have died in Africa in the earlier part of the fifth century." In the following year Mr. H. Bohn published a translation of the *De Augmentis*, which is little more than a reprint of Shaw's translation, revised and edited by Mr. Joseph Devey. In this edition *Orosius* is silently substituted for *Osorius* in the same passage, with this note: "Neither a Portuguese, nor a bishop, but a Spanish monk born at Tarragona, and sent by St. Augustine on a mission to Jerusalem in the commencement of the fifth century." The mistake is the more remarkable because the passage in Bacon refers obviously and unmistakably to the period of the Reformation.

[3] This point is omitted in the translation, except in so far as it is involved in an observation which is added under the next head — viz. that editors besides giving "some brief censure and judgment of their authors" should compare them with other writers on the same subjects. But I am inclined to suspect that the omission wa accidental; for the truth is, that without constant reference to the times and circumstances in which he wrote hardly any author can be properly understood.

studies; that men may know in what order or pursuit to read.[1]

For Pedantical knowledge, it containeth that difference of Tradition which is proper for youth; whereunto appertain divers considerations of great fruit.

As first, the timing and seasoning of knowledges; as with what to initiate them, and from what for a time to refrain them.

Secondly, the consideration where to begin with the easiest and so proceed to the more difficult; and in what courses[2] to press the more difficult and then to turn them to the more easy: for it is one method to practise swimming with bladders, and another to practise dancing with heavy shoes.

A third is the application of learning according unto the propriety of the wits; for there is no defect in the faculties intellectual but seemeth to have a proper cure contained in some studies: as for example, if a child be bird-witted, that is, hath not the faculty of attention, the Mathematics giveth a remedy thereunto; for in them, if the wit be caught away but a moment, one is new to begin. And as sciences have a propriety towards faculties for cure and help, so faculties or powers have a sympathy towards sciences for excellency or speedy profiting; and therefore it is an inquiry of great wisdom, what kinds of wits and natures are most apt and proper for what sciences.

Fourthly, the ordering of exercises is matter of great consequence to hurt or help; for as is well observed by Cicero, men in exercising their faculties, if they be not well advised, do exercise their faults and get ill habits as well as good; so as there is a great judgment to be had in the continuance and intermission of exercises. It were too long to particularise a number of other considerations of this nature, things but of mean appearance, but of singular efficacy. For as the wronging or cherishing of seeds or young plants is that that is most important to their thriving; and as it was noted that the first six kings being in truth as tutors of the state of Rome in the infancy thereof, was the principal cause of the immense greatness of that state which followed: so the culture and man-

[1] This point is also omitted in the translation; perhaps as included in the "censure and judgment;" which (he adds) is as it were the Critic's chair; an office ennobled in his time by some great men, *majores certe nostro judicio quam pro modulo criticorum*, — men above the stature of critics.

[2] So all the editions: probably a misprint for *cases*.

urance of minds in youth hath such a forcible (though unseen) operation, as hardly any length of time or contention of labour can countervail it afterwards. And it is not amiss to observe also how small and mean faculties gotten by education, yet when they fall into great men or great matters, do work great and important effects; whereof we see a notable example in Tacitus of two stage-players, Percennius and Vibulenus, who by their faculty of playing put the Pannonian armies into an extreme tumult and combustion. For there arising a mutiny amongst them upon the death of Augustus Cæsar, Blæsus the lieutenant had committed some of the mutiners; which were suddenly rescued; whereupon Vibulenus got to be heard speak, which he did in this manner: — *These poor innocent wretches, appointed to cruel death, you have restored to behold the light. But who shall restore my brother to me, or life unto my brother? that was sent hither in message from the legions of Germany to treat of the common cause, and he hath murdered him this last night by some of his fencers and ruffians, that he hath about him for his executioners upon soldiers. Answer, Blæsus, what is done with his body? The mortalest enemies do not deny burial. When I have performed my last duties to the corpse with kisses, with tears, command me to be slain besides him; so that these my fellows, for our good meaning and our true hearts to the legions, may have leave to bury us.*[1] With

[1] The last clause does not give the exact meaning of the original, from which it may seem that Bacon was reporting the speech from memory; unless it be that a line has accidentally dropped out. By inserting after "fellows" the words "seeing us put to death for no crime, but only for," &c. the sense would be represented with sufficient accuracy.

In the translation, this passage relating to "Pedantical knowledge,"— that is the knowledge which concerns the instruction of youth, — is considerably enlarged, and a distinct opinion is expressed upon many of the points which are here only noticed as worthy of enquiry. He begins by recommending the schools of the Jesuits as the best model, — an opinion which he had already intimated in the first book of the *Advancement*. He approves of a collegiate education both for boys and young men, as distinguished from a private education under masters. He wishes compendiums to be avoided, and the system which, aiming at precocity, produces overconfidence and a mere shew of proficiency. He would encourage independence of mind, and if any one shews a taste for studies which lie out of the regular course, and can find time to pursue them, he would by no means have him restrained. Of the two methods mentioned in the text, one beginning with the easiest tasks, the other with the most difficult, he recommends a judicious intermixture, as best for the advancement of the powers both of mind and body. With regard to the "application of learning according unto the propriety of the wits," he observes (besides its use as a corrective of mental defects) that masters ought to attend to it for the guidance of the parents in choosing their sons' course of life; and also because a man will advance so much faster in studies for which he has a natural aptitude than in any others. With regard to the "ordering of exercises" he recommends the system of intermissions. (*Itaque tutius est intermittere exercitia et subinde repetere, quam assidue continuare et urgere.*)

which speech he put the army into an infinite fury and uproar; whereas truth was he had no brother, neither was there any such matter, but he played it merely as if he had been upon the stage.

But to return: we are now come to a period of Rational Knowledges; wherein if I have made the divisions other than those that are received, yet would I not be thought to disallow all those divisions which I do not use. For there is a double necessity imposed upon me of altering the divisions. The one, because it differeth in end and purpose, to sort together those things which are next in nature, and those things which are next in use. For if a secretary of state should sort his papers, it is like in his study or general cabinet he would sort together things of a nature, as treaties, instructions, &c. but in his boxes or particular cabinet he would sort together those that he were like to use together, though of several natures; so in this general cabinet of knowledge it was necessary for me to follow the divisions of the nature of things; whereas if myself had been to handle any particular knowledge, I would have respected the divisions fittest for use. The other, because the bringing in of the deficiences did by consequence alter the partitions of the rest: for let the knowledge extant (for demonstration sake) be fifteen; let the knowledge with the deficiences be twenty; the parts of fifteen are not the parts of twenty; for the parts of fifteen are three and five; the parts of twenty are two, four, five, and ten. So as these things are without contradiction, and could not otherwise be.

¶ [1] We proceed now to that knowledge which considereth of

Lastly he would decidedly have the art of *acting* (*actio theatralis*) made a part of the education of youth. The Jesuits, he says, do not despise it; and he thinks they are right; for though it be of ill repute as a profession (*si sit professoria, infamis est*) yet as a part of *discipline* it is of excellent use. It strengthens the memory, it regulates the tone and effect of the voice and pronunciation, it teaches a decent carriage of the countenance and gesture, it begets no small degree of confidence, and accustoms young men to bear being looked at. In Bacon's time, when masques acted by young gentlemen of the Universities or Inns of Court were the favourite entertainment of princes, these things were probably better attended to than they are now—and he could have pointed no doubt to many living examples in illustration of his remark. The examples which modern experience supplies are all of the negative kind, but not therefore the less significant. The art of speaking, of recitation, even of reading aloud, is not now taught at all; and the consequence is, that even among men otherwise accomplished not many will be found who can either speak a speech of their own, or recite the speech of another, or read a book aloud, so as to be listened to with pleasure in a mixed company for a quarter of an hour together.

[1] De Aug. vii. 1.

the Appetite[1] and Will of Man; whereof Salomon saith, *Ante omnia, fili, custodi cor tuum; nam inde procedunt actiones vitæ:* [keep thy heart with all diligence, for thereout come the actions of thy life]. In the handling of this science, those which have written seem to me to have done as if a man that professeth to teach to write did only exhibit fair copies of alphabets and letters joined, without giving any precepts or directions for the carriage of the hand and framing of the letters. So have they made good and fair exemplars and copies, carrying the draughts and portraitures of Good, Virtue, Duty, Felicity; propounding them well described as the true objects and scopes of man's will and desires; but how to attain these excellent marks, and how to frame and subdue the will of man to become true and conformable to these pursuits, they pass it over altogether, or slightly and unprofitably. For it is not the disputing *that moral virtues are in the mind of man by habit and not by nature,* or the distinguishing *that generous spirits are won by doctrines and persuasions, and the vulgar sort by reward and punishment*[2], and the like scattered glances and touches, that can excuse the absence of this part.

The reason of this omission I suppose to be that hidden rock whereupon both this and many other barks of knowledge have been cast away; which is, that men have despised to be conversant in ordinary and common matters; the judicious direction whereof nevertheless is the wisest doctrine (for life consisteth not in novelties or subtilities); but contrariwise they have compounded sciences chiefly of a certain resplendent or lustrous mass of matter, chosen to give glory either to the subtility of disputations or to the eloquence of discourses. But Seneca giveth an excellent check to eloquence; *Nocet illis eloquentia, quibus non rerum cupiditatem facit, sed sui:* [eloquence does mischief when it draws men's attention away from the matter to fix it on itself]. Doctrines should be such as should make men in love with the lesson, and not with the teacher; being directed to the auditor's benefit, and not to the author's commendation: and therefore those are of the right kind which may be concluded as Demosthenes concludes his

[1] In the translation the word *Appetite* is omitted: and the Will is described as governed by right reason, seduced by apparent good, having the passions for spurs, the organs and voluntary motions for ministers.

[2] Or the giving it in precept (he adds in the translation) that if you would rectify the mind you must bend it like a wand in the direction contrary to its inclination.

counsel, *Quæ si feceritis, non oratorem duntaxat in præsentia laudabitis, sed vosmetipsos etiam non ita multo post statu rerum vestrarum meliore:* [if you follow this advice you will do a grace to yourselves no less than to the speaker, — to him by your vote to-day, to yourselves by the improvement which you will presently find in your affairs].

Neither needed men of so excellent parts to have despaired of a fortune which the poet Virgil promised himself, (and indeed obtained,) who got as much glory of eloquence, wit, and learning in the expressing of the observations of husbandry, as of the heroical acts of Æneas: —

> Nec sum animi dubius, verbis ea vincere magnum
> Quam sit, et angustis his addere rebus honorem.
> [How hard the task alas full well I know
> With charm of words to grace a theme so low.]

And surely if the purpose be in good earnest not to write at leisure that which men may read at leisure, but really to instruct and suborn action and active life, these Georgics of the mind, concerning the husbandry and tillage thereof, are no less worthy than the heroical descriptions of Virtue, Duty, and Felicity. Wherefore the main and primitive division of moral knowledge seemeth to be into the Exemplar or Platform of Good, and the Regiment or Culture of the Mind; the one describing the nature of good, the other prescribing rules how to subdue, apply, and accommodate the will of man thereunto.

The doctrine touching the Platform or Nature of Good considereth it either Simple or Compared; either the kinds of good, or the degrees of good: in the later whereof those infinite disputations which were touching the supreme degree thereof, which they term felicity, beatitude, or the highest good, the doctrines concerning which were as the heathen divinity, are by the Christian faith discharged. And as Aristotle saith, *That young men may be happy, but not otherwise but by hope;* so we must all acknowledge our minority, and embrace the felicity which is by hope of the future world.

Freed therefore and delivered from this doctrine of the philosophers' heaven, whereby they feigned an higher elevation of man's nature than was, (for we see in what an height of style Seneca writeth, *Vere magnum, habere fragilitatem hominis, securitatem Dei,* [it is true greatness to have in one the frailty of a man and the security of a God,] we may with more so-

briety and truth receive the rest of their inquiries and labours. Wherein for the Nature of Good Positive or Simple, they have set it down excellently, in describing the forms of Virtue and Duty, with their situations and postures, in distributing them into their kinds, parts, provinces, actions, and administrations, and the like: nay farther, they have commended them to man's nature and spirit with great quickness of argument and beauty of persuasions; yea, and fortified and intrenched them (as much as discourse can do) against corrupt and popular opinions. Again, for the Degrees and Comparative Nature of Good, they have also excellently handled it in their triplicity of Good, in the comparisons between a contemplative and an active life, in the distinction between virtue with reluctation and virtue secured, in their encounters between honesty and profit, in their balancing of virtue with virtue, and the like; so as this part deserveth to be reported for excellently laboured.[1]

Notwithstanding, if before they had come to the popular and received notions of virtue and vice, pleasure and pain, and the rest, they had stayed a little longer upon the inquiry concerning the roots of good and evil, and the strings of those roots, they had given, in my opinion, a great light to that which followed; and specially if they had consulted with nature, they had made their doctrines less prolix and more profound; which being by them in part omitted and in part handled with much confusion, we will endeavour to resume and open in a more clear manner.

There is formed in every thing a double nature of good: the one, as every thing is a total or substantive in itself; the other, as it is a part or member of a greater body; whereof the later is in degree the greater and the worthier, because it tendeth to the conservation of a more general form. Therefore we see the iron in particular sympathy moveth to the loadstone; but yet if it exceed a certain quantity, it forsaketh the affection to the loadstone, and like a good patriot moveth to the earth, which is the region and country of massy bodies; so may we go forward, and see that water and massy bodies move to the centre of the earth; but rather than to suffer a divulsion in the continuance of nature, they will move upwards from the centre

[1] Well by the ancient philosophers, but still better (according to the translation) by the divines in their discussions of moral duties and virtues, cases of conscience, sins, &c.

of the earth, forsaking their duty to the earth in regard of their duty to the world. This double nature of good, and the comparative thereof, is much more engraven upon man, if he degenerate not; unto whom the conservation of duty to the public ought to be much more precious than the conservation of life and being: according to that memorable speech of Pompeius Magnus, when being in commission of purveyance for a famine at Rome, and being dissuaded with great vehemency and instance by his friends about him that he should not hazard himself to sea in an extremity of weather, he said only to them, *Necesse est ut eam, non ut vivam:* [it is needful that I go, not that I live]. But it may be truly affirmed that there was never any philosophy, religion, or other discipline, which did so plainly and highly exalt the good which is communicative, and depress the good which is private and particular, as the Holy Faith; well declaring, that it was the same God that gave the Christian law to men, who gave those laws of nature to inanimate creatures that we spake of before; for we read that the elected saints of God have wished themselves anathematized and razed out of the book of life, in an ecstasy of charity and infinite feeling of communion.

This being set down and strongly planted, doth judge and determine most of the controversies wherein Moral Philosophy is conversant. For first it decideth the question touching the preferment of the contemplative or active life, and decideth it against Aristotle. For all the reasons which he bringeth for the contemplative are private, and respecting the pleasure and dignity of a man's self, (in which respects no question the contemplative life hath the pre-eminence:) not much unlike to that comparison which Pythagoras made for the gracing and magnifying of philosophy and contemplation; who being asked what he was, answered, *That if Hiero were ever at the Olympian games, he knew the manner, that some came to try their fortune for the prizes, and some came as merchants to utter their commodities, and some came to make good cheer and meet their friends, and some came to look on; and that he was one of them that came to look on.* But men must know, that in this theatre of man's life it is reserved only for God and Angels to be lookers on. Neither could the like question ever have been received in the church, notwithstanding their *Pretiosa in oculis Domini mors sanctorum ejus,* [precious in the sight of the Lord

is the death of his saints,] by which place they would exalt their civil death and regular professions, but upon this defence, that the monastical life is not simple [1] contemplative, but performeth the duty either of incessant prayers and supplications, which hath been truly esteemed as an office in the church, or else of writing or taking [2] instructions for writing concerning the law of God, as Moses did when he abode so long in the mount. And so we see Henoch the seventh from Adam, who was the first Contemplative and walked with God, yet did also endow the church with prophecy, which St. Jude citeth. But for contemplation which should be finished in itself without casting beams upon society, assuredly divinity knoweth it not.

It decideth also the controversies between Zeno and Socrates and their schools and successions on the one side, who placed felicity in virtue simply or attended; the actions and exercises whereof do chiefly embrace and concern society; and on the other side[3], the Cyrenaics and Epicureans, who placed it in pleasure, and made virtue (as it is used in some comedies of errors, wherein the mistress and the maid change habits,) to be but as a servant, without which pleasure cannot be served and attended; and the reformed school of the Epicureans, which placed it in serenity of mind and freedom from perturbation; as if they would have deposed Jupiter again, and restored Saturn and the first age, when there was no summer nor winter, spring nor autumn, but all after one air and season; and Herillus[4], which placed felicity in extinguishment of the disputes of the mind, making no fixed nature of good and evil, esteeming things according to the clearness of the desires, or the reluctation[5]; which opinion was revived in the heresy of the Anabaptists, measuring things according to the motions of the spirit, and the constancy or wavering of belief: all which are

[1] Edd. 1629 and 1633 have *simply*.

[2] So edd. 1629 and 1633. The original has *in taking*. In the translation the words "taking instructions for writing" are omitted; as applicable, I suppose, to the case of Moses only, not of the Church; and *multo in otio* substituted.

[3] *Et reliquas complures sectas et scholas, ex altera parte: veluti*, &c. All the opinions which are about to be cited belong to "the other side"—*i. e.* the side opposed to that of Zeno and Socrates; a point which from the careless composition of the English is not immediately clear.

[4] The translation has "and lastly that exploded school of Pyrrho and Herillus."

[5] That is, esteeming those actions good which are attended with clearness and composure of mind, those bad which proceed with dislike and reluctation — (*actiones pro bonis aut malis habentes, prout ex animo, motu puro et irrefracto, aut contra cum aversatione et reluctatione, prodirent*).

manifest to tend to private repose and contentment, and not to point of society.

It censureth also the philosophy of Epictetus, which presupposeth that felicity must be placed in those things which are in our power, lest we be liable to fortune and disturbance: as if it were not a thing much more happy to fail in good and virtuous ends for the public, than to obtain all that we can wish to ourselves in our proper fortune; as Consalvo said to his soldiers, shewing them Naples, and protesting he had rather die one foot forwards than to have his life secured for long by one foot of retreat; whereunto the wisdom of that heavenly leader hath signed, who hath affirmed that *a good conscience is a continual feast:* shewing plainly that the conscience of good intentions, howsoever succeeding, is a more continual joy to nature than all the provision which can be made for security and repose.

It censureth likewise that abuse of philosophy which grew general about the time of Epictetus, in converting it into an occupation or profession; as if the purpose had been, not to resist and extinguish perturbations, but to fly and avoid the causes of them, and to shape a particular kind and course of life to that end; introducing such an health of mind, as was that health of body of which Aristotle speaketh of Herodicus, who did nothing all his life long but intend his health: whereas if men refer themselves to duties of society, as that health of body is best which is ablest to endure all alterations and extremities, so likewise that health of mind is most proper[1] which can go through the greatest temptations and perturbations. So as Diogenes' opinion is to be accepted, who commended not them which abstained, but them which sustained, and could refrain their mind *in præcipitio,* and could give unto the mind (as is used in horsemanship) the shortest stop or turn.

Lastly, it censureth the tenderness and want of application[2] in some of the most ancient and reverend philosophers and philosophical men, that did retire too easily from civil business, for avoiding of indignities and perturbations; whereas the resolution of men truly moral ought to be such as the same Con-

[1] *i. e.* that mind is to be considered truly and properly healthy—(*animus ille demum vere et propria sanus et validus censendus est*).

[2] meaning what we should now rather call want of compliance or accommodation—(*ineptitudinem ad morigerandum*).

salvo said the honour of a soldier should be, *e telâ crassiore*, [of a stouter web,] and not so fine as that every thing should catch in it and endanger it.

¶[1] To resume Private or Particular Good, it falleth into the division of Good Active and Passive: for this difference of Good (not unlike to that which amongst the Romans was expressed in the familiar or household terms of Promus and Condus) is formed also in all things; and is best disclosed in the two several appetites in creatures, the one to preserve or continue themselves, and the other to dilate or multiply themselves; whereof the later seemeth to be the worthier. For in nature, the heavens, which are the more worthy, are the agent; and the earth, which is the less worthy, is the patient. In the pleasures of living creatures, that of generation is greater than that of food. In divine doctrine, *Beatius est dare quam accipere:* [it is more blessed to give than to receive]. And in life, there is no man's spirit so soft, but esteemeth the effecting of somewhat that he hath fixed in his desire more than sensuality. Which priority of the Active Good is much upheld by the consideration of our estate to be mortal and exposed to fortune; for if we might have a perpetuity and certainty in our pleasures, the *state*[2] of them would advance their price; but when we see it is but *Magni æstimamus mori tardius,* [we think it a great matter to be a little longer in dying,] and *Ne glorieris de crastino, nescis partum diei,* [boast not thyself of tomorrow, thou knowest not what the day may bring forth,] it maketh us to desire to have somewhat secured and exempted from time; which are only our deeds and works; as it is said *Opera eorum sequuntur eos:* [their works follow them]. The pre-eminence likewise of this Active Good is upheld by the affection which is natural in man towards variety and proceeding; which in the pleasures of the sense (which is the principal part of Passive Good) can have no great latitude: *Cogita quamdiu eadem feceris; cibus, somnus, ludus; per hunc circulum curritur; mori velle non tantum fortis, aut miser, aut prudens, sed etiam fastidiosus potest:* [if you consider, says Seneca, how often you do the same thing over and over; food sleep exercise, and then food sleep exercise again, and so round and round; you will think that there needs neither fortitude nor

[1] De Aug. vii. 2.

[2] *i. e.* the stability. (*securitas et mora.*)

misery nor wisdom to reconcile a man to death; one might wish to die for mere weariness of being alive]. But in enterprises, pursuits, and purposes of life, there is much variety; whereof men are sensible with pleasure in their inceptions, progressions, recoils, reintegrations, approaches, and attainings to their ends: so as it was well said, *Vita sine proposito languida et vaga est:* [life without an object to pursue is a languid and tiresome thing]. Neither hath this Active Good any[1] identity with the good of society, though in some case it hath an incidence into it: for although it do many times bring forth acts of beneficence, yet it is with a respect private to a man's own power, glory, amplification, continuance; as appeareth plainly when it findeth a contrary subject. For that gigantine state of mind which possesseth the troublers of the world, such as was Lucius Sylla, and infinite other in smaller model, who would have all men happy or unhappy as they were their friends or enemies, and would give form to the world according to their own humours, (which is the true Theomachy,) pretendeth and aspireth to active good[2], though it recedeth furthest from good of society, which we have determined to be the greater.

To resume Passive Good, it receiveth a subdivision of Conservative and Perfective. For let us take a brief review of that which we have said: we have spoken first of the Good of Society, the intention whereof embraceth the form of Human Nature, whereof we are members and portions, and not our own proper and individual form; we have spoken of Active Good, and supposed it as a part of Private and Particular Good; and rightly[3]; for there is impressed upon all things a triple desire or appetite proceeding from love to themselves; one of preserving and continuing their form; another of advancing and perfecting their form; and a third of multiplying and extending their form upon other things; whereof the multiplying or signature of it upon other things is that which we handled by the name of Active Good. So as there remaineth the conserving of it, and perfecting or raising of it; which later is the highest degree of Passive Good. For to preserve in state is the less, to preserve with advancement is the greater.

[1] So edd. 1629 and 1633. The original has *and*.

[2] *i. e.* apparent good of the individual—(*bonum activum individuale saltem apparens*).

[3] This passage, from *for let us take* &c. to *rightly*, is omitted in the translation; and the argument proceeds more clearly without it.

So in man,

> Igneus est ollis vigor, et cœlestis origo.[1]
> [The living fire that glows those seeds within
> Remembers its celestial origin.]

His approach or assumption to divine or angelical nature is the perfection of his form; the error or false imitation of which good is that which is the tempest of human life; while man, upon the instinct of an advancement formal and essential, is carried to seek an advancement local. For as those which are sick, and find no remedy, do tumble up and down and change place, as if by a remove local they could obtain a remove internal; so is it with men in ambition, when failing of the mean to exalt their nature, they are in a perpetual estuation to exalt their place. So then Passive Good is, as was said, either Conservative or Perfective.

To resume the good of Conservation or Comfort, which consisteth *in the fruition of that which is agreeable to our natures;* it seemeth to be the most pure and natural of pleasures, but yet the softest and the lowest. And this also receiveth a difference, which hath neither been well judged of nor well enquired. For the good of fruition or contentment is placed either in the sincereness of the fruition, or in the quickness and vigour of it; the one superinduced by the equality, the other by vicissitude; the one having less mixture of evil, the other more impression of good. Whether of these is the greater good, is a question controverted; but whether man's nature may not be capable of both, is a question not enquired.

The former question being debated between Socrates and a Sophist, Socrates placing felicity in an equal and constant peace of mind, and the Sophist in much desiring and much enjoying, they fell from argument to ill words: the Sophist saying that Socrates' felicity was the felicity of a block or stone; and Socrates saying that the Sophist's felicity was the felicity of one that had the itch, who did nothing but itch and scratch. And both these opinions do not want their supports. For the opinion of Socrates is much upheld by the general consent even of the Epicures themselves, that virtue beareth a great part in felicity; and if so, certain it is that virtue hath more

[1] The connexion of this with the preceding sentence is made clearer in the translation by the remark that there are found throughout the universe certain nobler natures which inferior natures recognise as their origin and towards which they aspire.

use in clearing perturbations than in compassing desires. The Sophist's opinion is much favoured by the assertion we last spake of, that good of advancement is greater than good of simple preservation; because every obtaining a desire hath a shew of advancement [1], as motion though in a circle hath a shew of progression.

But the second question, decided the true way, maketh the former superfluous. For can it be doubted but that there are some who take more pleasure in enjoying pleasures than some other, and yet nevertheless are less troubled with the loss or leaving of them? so as this same *Non uti ut non appetas, non appetere ut non metuas, sunt animi pusilli et diffidentis:* [to abstain from the use of a thing that you may not feel a want of it; to shun the want that you may not fear the loss of it; are the precautions of pusillanimity and cowardice [2]]. And it seemeth to me, that most of the doctrines of the philosophers are more fearful and cautionary than the nature of things requireth. So have they increased the fear of death in offering to cure it. For when they would have a man's whole life to be but a discipline or preparation to die, they must needs make men think that it is a terrible enemy against whom there is no end of preparing. Better saith the poet:

> Qui finem vitæ extremum inter munera ponat
> Naturæ:

[the end of life is to be counted among the boons of nature]. So have they sought to make men's minds too uniform and harmonical, by not breaking them sufficiently to contrary motions: the reason whereof I suppose to be, because they themselves were men dedicated to a private, free, and unapplied course of life. For as we see, upon the lute or like instrument, a *ground*, though it be sweet and have shew of many changes, yet breaketh not the hand to such strange and hard stops and passages as a *set song* or *voluntary;* much after the same manner was the diversity between a philosophical and a civil life. [3] And therefore men are to imitate the wisdom of

[1] *i. e.* towards the perfection of nature; only a *shew* of advancement, however, not necessarily a real one—(*quia rerum cupitarum adeptiones naturam videantur sensim perficere; quod licet vere non faciant, tamen,* &c.).

[2] Compare Shakspeare's sonnet—

> I cannot chuse
> But weep to have that which I fear to lose.

[3] This illustration is omitted in the translation.

jewellers; who, if there be a grain or a cloud or an ice which may be ground forth without taking too much of the stone, they help it; but if it should lessen and abate the stone too much, they will not meddle with it: so ought men so to procure serenity as they destroy not magnanimity.

Having therefore deduced the Good of Man which is Private and Particular as far as seemeth fit, we will now return to that good of man which respecteth and beholdeth society, which we may term Duty; because the term of Duty is more proper to a mind well framed and disposed towards others, as the term of Virtue is applied to a mind well formed and composed in itself; though neither can a man understand Virtue without some relation to society, nor Duty without an inward disposition. This part may seem at first to pertain to science civil and politic; but not if it be well observed. For it concerneth the regiment and government of every man over himself, and not over others. And as in architecture the direction of framing the posts, beams, and other parts of building, is not the same with the manner of joining them and erecting the building; and in mechanicals, the direction how to frame an instrument or engine, is not the same with the manner of setting it on work and employing it; and yet nevertheless in expressing of the one you incidently express the aptness towards the other; so the doctrine of conjugation of men in society differeth from that of their conformity thereunto.[1]

This part of Duty is subdivided into two parts; the common duty of every man, as a man or member of a state; the other, the respective or special duty of every man, in his profession, vocation, and place. The first of these is extant and well laboured, as hath been said. The second likewise I may report rather dispersed than deficient; which manner of dispersed writing in this kind of argument I acknowledge to be best. For who can take upon him to write of the proper duty, virtue, challenge, and right of every several vocation, profession and place? For although sometimes a looker on may see more than a gamester, and there be a proverb more arrogant than sound,

[1] *i. e.* of the conformation of men to the business of society — (*quæ eos reddit ad hujusmodi societatis commoda conformes et bene affectos*).

That the vale best discovereth the hill; yet there is small doubt but that men can write best and most really and materially in their own professions; and that the writing of speculative men of active matter for the most part doth seem to men of experience, as Phormio's argument of the wars seemed to Hannibal, to be but dreams and dotage. Only there is one vice which accompanieth them that write in their own professions, that they magnify them in excess. But generally it were to be wished (as that which would make learning indeed solid and fruitful) that active men would or could become writers.

In which kind I cannot but mention, *honoris causa,* your Majesty's excellent book touching the duty of a king: a work richly compounded of divinity, morality, and policy, with great aspersion of all other arts; and being in mine opinion one of the most sound and healthful writings that I have read; not distempered in the heat of invention, nor in the coldness of negligence; not sick of dizziness [1], as those are who leese themselves in their order; nor of convulsions [2], as those which cramp in matters impertinent; not savouring of perfumes and paintings, as those do who seek to please the reader more than nature [3] beareth; and chiefly well disposed in the spirits thereof, being agreeable to truth and apt for action; and far removed from that natural infirmity, whereunto I noted those that write in their own professions to be subject, which is, that they exalt it above measure. For your Majesty hath truly described, not a king of Assyria or Persia in their extern glory, but a Moses or a David, pastors of their people. Neither can I ever leese out of my remembrance what I heard your Majesty in the same sacred spirit of government deliver in a great cause of judicature, which was, *That Kings ruled by their laws as God did by the laws of nature, and ought as rarely to put in use their supreme prerogative as God doth his power of working miracles.* And yet notwithstanding, in your book of a free monarchy, you do well give men to understand, that you know the pleni-

[1] *Dusinesse* in the original. *Businesse* in edd. 1629 and 1623. *Vertigine* in De Aug.

[2] The words "convulsion" and "cramp" seem to describe a forced and abrupt style; an idea not implied in the words of the translation, which may be retranslated thus: "not distracted in digressions, as those which wind about to take in matters impertinent" — (*ut illa quæ nihil ad rhombum sunt expatiatione aliqua flexuosa complectatur*).

[3] *i. e.* the nature of the argument.—(*qui lectorum potius delectationi quam argumenti naturæ inserviunt*).

tude of the power and right of a King, as well as the circle of his office and duty. Thus have I presumed to allege this excellent writing of your Majesty, as a prime or eminent example of tractates concerning special and respective duties; wherein I should have said as much, if it had been written a thousand years since. Neither am I moved with certain courtly decencies, which esteem it flattery to praise in presence. No, it is flattery to praise in absence; that is, when either the virtue is absent, or the occasion is absent; and so the praise is not natural, but forced, either in truth or in time. But let Cicero be read in his oration *pro Marcello*, which is nothing but an excellent table of Cæsar's virtue, and made to his face; besides the example of many other excellent persons, wiser a great deal than such observers[1]; and we will never doubt, upon a full occasion, to give just praises to present or absent.

But to return: there belongeth further to the handling of this part[2] touching the duties of professions and vocations, a Relative or opposite, touching the frauds, cautels, impostures, and vices of every profession; which hath been likewise handled: but how? rather in a satire and cynically, than seriously and wisely: for men have rather sought by wit to deride and traduce much of that which is good in professions, than with judgment to discover and sever that which is corrupt. For, as Salomon saith, He that cometh to seek after knowledge with a mind to scorn and censure, shall be sure to find matter for his humour, but no matter for his instruction: *Quærenti derisori scientiam ipsa se abscondit; sed studioso fit obviam.* But the managing of this argument with integrity and truth, which I note as deficient, seemeth to me to be one of the best fortifications for honesty and virtue that can be planted. For as the fable goeth of the Basilisk, that if he see you first you die for it, but if you see him first he dieth; so is it with deceits and evil arts; which if they be first espied they leese their life, but if they prevent they endanger. So that we are much beholden to Machiavel and others, that write what men do and not what they ought to do. For it is not possible to join serpentine wisdom with the columbine innocency, except men

[1] In the translation he merely adds the single example of Pliny the younger in his Panegyric on Trajan. When he wrote the *Advancement of Learning*, he appears to have been under the impression that Pliny's Panegyric was spoken after Trajan's death. See below, p. 442.

[2] So edd. 1629 and 1633. The original has *partie*.

know exactly all the conditions of the serpent; his baseness and going upon his belly, his volubility and lubricity, his envy and sting, and the rest; that is, all forms and natures of evil. For without this, virtue lieth open and unfenced. Nay an honest man can do no good upon those that are wicked to reclaim them, without the help of the knowledge of evil. For men of corrupted minds presuppose that honesty groweth out of simplicity of manners, and believing of preachers, schoolmasters, and men's exterior language: so as, except you can make them perceive that you know the utmost reaches of their own corrupt opinions, they despise all morality. *Non recipit stultus verba prudentiæ, nisi ea dixeris quæ versantur in corde ejus:* [the fool will not listen to the words of the wise, unless you first tell him what is in his own heart].[1]

Unto this part touching Respective Duty doth also appertain the duties between husband and wife, parent and child, master and servant: so likewise the laws of friendship and gratitude, the civil bond of companies, colleges, and politic bodies, of neighbourhood, and all other proportionate duties; not as they are parts of government and society, but as to the framing of the mind of particular persons.

The knowledge concerning good respecting Society doth handle it also not simply alone, but comparatively; whereunto belongeth the weighing of duties between person and person, case and case, particular and public: as we see in the proceeding[2] of Lucius Brutus against his own sons, which was so much extolled; yet what was said?

Infelix, utcunque ferent ea facta[3] minores:

[unhappy man! whatever judgment posterity shall pass upon that deed, &c.]. So the case was doubtful, and had opinion on both sides. Again, we see when M. Brutus and Cassius invited to a supper certain whose opinions they meant to feel, whether they were fit to be made their associates, and cast forth the question touching the killing of a tyrant being an usurper, they were divided in opinion; some holding that servitude was the extreme of evils, and others that tyranny was better than a civil war: and a number of the like cases there are of com-

[1] In the translation this is set down as a *desideratum* under the title of *Satira Seria sive tractatus de interioribus rerum.*

[2] *in animadversione illa severa et atroci.* — De Aug.

[3] *Fata* both in the *Advancement* and in the *De Augmentis.*

parative duty. Amongst which that of all others is the most frequent, where the question is of a great deal of good to ensue of a small injustice. Which Jason of Thessalia determined against the truth: *Aliqua sunt injuste facienda, ut multa juste fieri possint:* [that there may be justice in many things there must be injustice in some]. But the reply is good, *Authorem præsentis justitiæ habes, sponsorem futuræ non habes:* [the justice that is to be done now is in your power, but where is your security for that which is to be done hereafter?] Men must pursue things which are just in present, and leave the future to the divine Providence. So then we pass on from this general part touching the exemplar and description of good.

De Cultura Animi.

¶ [1] Now therefore that we have spoken of this fruit of life, it remaineth to speak of the husbandry that belongeth thereunto; without which part the former seemeth to be no better than a fair image or statua, which is beautiful to contemplate, but is without life and motion: whereunto Aristotle himself subscribeth in these words: *Necesse est scilicet de virtute dicere, et quid sit, et ex quibus gignatur. Inutile enim fere fuerit virtutem quidem nosse, acquirendæ autem ejus modos et vias ignorare. Non enim de virtute tantum, qua specie sit, quærendum est, sed et quomodo sui copiam faciat: utrumque enim volumus, et rem ipsam nosse, et ejus compotes fieri: hoc autem ex voto non succedet, nisi sciamus et ex quibus et quomodo:* [it is necessary to determine concerning Virtue not only what it is but whence it proceeds. For there would be no use in knowing Virtue without knowing the ways and means of acquiring it. For we have to consider not only what it is, but how it is to be had. For we want both to know virtue and to be virtuous; which we cannot be without knowing both the whence and the how]. In such full words and with such iteration doth he inculcate this part. So saith Cicero in great commendation of Cato the second, that he had applied himself to philosophy *non ita disputandi causa, sed ita vivendi:* [not that he might talk like a philosopher, but that he might live like one]. And although the neglect of our times, wherein few men do hold any consultations touching the reformation of their life, (as Seneca excellently saith, *De partibus vitæ quisque deliberat, de summâ nemo,*) [every man takes thought about

[1] De Aug. vii. 3.

the parts of his life, no man about the whole,] may make this part seem superfluous; yet I must conclude with that aphorism of Hippocrates, *Qui gravi morbo correpti dolores non sentiunt, iis mens ægrotat;* [they that are sick and yet feel no pain are sick in their minds;] they need medicine not only to assuage the disease but to awake the sense. And if it be said that the cure of men's minds belongeth to sacred Divinity, it is most true: but yet Moral Philosophy may be preferred unto her as a wise servant and humble handmaid. For as the Psalm saith, *that the eyes of the handmaid look perpetually towards the mistress,* and yet no doubt many things are left to the discretion of the handmaid to discern of the mistress' will; so ought Moral Philosophy to give a constant attention to the doctrines of Divinity, and yet so as it may yield of herself (within due limits) many sound and profitable directions.

This part therefore, because of the excellency thereof, I cannot but find exceeding strange that it is not reduced to written inquiry; the rather because it consisteth of much matter wherein both speech and action is often conversant, and such wherein the common talk of men (which is rare, but yet cometh sometimes to pass) is wiser than their books. It is reasonable therefore that we propound it in the more particularity, both for the worthiness, and because we may acquit ourselves for reporting it deficient; which seemeth almost incredible, and is otherwise conceived and presupposed by those themselves that have written. We will therefore enumerate some heads or points thereof, that it may appear the better what it is, and whether it be extant.

First therefore, in this, as in all things which are practical, we ought to cast up our account, what is in our power and what not; for the one may be dealt with by way of alteration, but the other by way of application only. The husbandman cannot command neither the nature of the earth nor the seasons of the weather; no more can the physician the constitution of the patient nor the variety of accidents. So in the culture and cure of the mind of man, two things are without our command; points of nature, and points of fortune; for to the basis of the one, and the conditions of the other, our work is limited and tied. In these things therefore it is left unto us to proceed by application:

Vincenda est omnis fortuna ferendo:

[all fortune may be overcome by endurance or suffering;] and so likewise,

Vincenda est omnis natura ferendo:

[all nature may be overcome by suffering]. But when that we speak of suffering, we do not speak of a dull and neglected suffering, but of a wise and industrious suffering, which draweth and contriveth use and advantage out of that which seemeth adverse and contrary; which is that property which we call Accommodating or Applying.[1] Now the wisdom of application resteth principally in the exact and distinct knowledge of the precedent state or disposition unto which we do apply: for we cannot fit a garment, except we first take measure of the body.

So then the first article of this knowledge is to set down sound and true distributions and descriptions of the several characters and tempers of men's natures and dispositions, specially having regard to those differences which are most radical in being the fountains and causes of the rest, or most frequent in concurrence or commixture[2]; wherein it is not the handling of a few of them in passage, the better to describe the mediocrities of virtues, that can satisfy this intention; for if it deserve to be considered, *that there are minds which are proportioned to great matters, and others to small,* (which Aristotle handleth or ought to have handled by the name of Magnanimity,) doth it not deserve as well to be considered, *that there are minds proportioned to intend many matters, and others to few?*[3] so that some can divide themselves, others can perchance do exactly well, but it must be but in few things at once; and so there cometh to be a *narrowness of mind,* as well as a *pusillanimity.* And again, *that some minds are proportioned to that which may be dispatched at once, or within a short return of time; others to that which begins afar off, and is to be won with length of pursuit;*

Jam tum tenditque fovetque:

[he begins to attend and nurse his project while it is yet in the cradle;] so that there may be fitly said to be a *lon-*

[1] These observations are omitted in the translation, and the whole passage is rewritten, though rather with a view of expressing the meaning more clearly than of altering it.

[2] It is remarkable that the observations which follow, down to "benignity or malignity," are entirely omitted in the translation.

[3] So all the editions: a second *intend* having probably dropped out accidentally.

ganimity; which is commonly also ascribed to God as a *magnanimity.* So further deserved it to be considered by Aristotle, *that there is a disposition in conversation (supposing it in things which do in no sort touch or concern a man's self) to soothe and please, and a disposition contrary to contradict and cross;* and deserveth it not much better to be considered, *that there is a disposition, not in conversation or talk but in matter of more serious nature, (and supposing it still in things merely indifferent,) to take pleasure in the good of another, and a disposition contrariwise to take distaste at the good of another;* which is that property[1] which we call good-nature or ill-nature, benignity or malignity? And therefore I cannot sufficiently marvel that this part of knowledge touching the several characters of natures and dispositions should be omitted both in morality and policy, considering it is of so great ministery and suppeditation to them both. A man shall find in the traditions of astrology some pretty and apt divisions of men's natures, according to the predominances of the planets; *lovers of quiet, lovers of action, lovers of victory, lovers of honour, lovers of pleasure, lovers of arts, lovers of change,* and so forth. A man shall find in the wisest sort of these Relations which the Italians make touching Conclaves, the natures of the several Cardinals handsomely and lively painted forth. A man shall meet with in every day's conference the denominations of *sensitive, dry, formal, real, humorous, certain, huomo di prima impressione, huomo di ultima impressione,* and the like[2]: and yet nevertheless this kind of observations wandereth in words, but is[3] not fixed in inquiry. For the distinctions are found (many of them), but we conclude no precepts upon them; wherein our fault is the greater, because both history, poesy, and daily experience are as goodly fields where these observations grow; whereof we make a few posies to hold in our hands, but no man bringeth them to the confectionary, that receits might be made of them for use of life.[4]

[1] *properly* both in the original, and in edd. 1629 and 1633.

[2] This sentence is omitted in the translation; perhaps from the difficulty of finding equivalent terms in Latin; but the substance of the observation is contained in the remark (transplanted from a former paragraph) that in this matter the common talk of men is wiser than their books.

[3] *as* both in the original and in edd. 1629 and 1633.

[4] In place of this we have in the translation a passage of considerable length recommending the wiser sort of historians as supplying the best material for this kind of treatise; not only in the formal character which they commonly give of any principal personage on recording his death, but still more in the occasional observations inter-

Of much like kind are those impressions of nature, which are imposed upon the mind *by the sex, by the age, by the region, by health and sickness, by beauty and deformity,* and the like, which are inherent and not extern; and again those which are caused by extern fortune; as *sovereignty, nobility, obscure birth, riches, want, magistracy, privateness, prosperity, adversity, constant fortune, variable fortune, rising per saltum, per gradus,* and the like. And therefore we see that Plautus maketh it a wonder to see an old man beneficent; *benignitas hujus ut adolescentuli est:* [he is as generous as if he were a young man:] St. Paul concludeth that severity of discipline was to be used to the Cretans, *Increpa eos durè,* [rebuke them sharply,] upon the disposition of their country; *Cretenses semper mendaces, malæ bestiæ, ventres pigri:* [the Cretans are alway liars, evil beasts, slow bellies:] Sallust noteth that it is usual with Kings to desire contradictories; *Sed plerumque regiæ voluntates, ut vehementes sunt, sic mobiles, sæpeque ipsæ sibi adversæ:* [royal desires, as they are violent, so are they changeable, and often incompatible with each other:] Tacitus observeth how rarely raising of the fortune mendeth the disposition; *Solus Vespasianus mutatus in melius:* [Vespasian the only one of the emperors that changed for the better:] Pindarus maketh an observation that great and sudden fortune for the most part defeateth men[1]; *Qui magnam felicitatem concoquere non possunt:* [that cannot digest great felicity:] so the Psalm sheweth it is more easy to keep a measure in the enjoying[2] of fortune than in the increase of fortune; *Divitiæ si affluant, nolite cor apponere:* [if riches increase set not your heart upon them]. These observations and the like I deny not but are touched a little by Aristotle as in passage in his Rhetorics, and are handled in some scattered discourses; but they were never incorporate into Moral Philosophy, to which they do

woven into the body of the narrative, when in relating any of his actions they introduce some remark upon his nature and disposition. Bacon instances the character of Africanus and the elder Cato as drawn by Livy; of Tiberius, Claudius, and Nero, in Tacitus; of Septimius Severus, in Herodian; of Louis XI. in Philip de Comines; of Ferdinand, Maximilian, Leo, and Clement, in Guicciardini. (His own Henry VII. would have furnished another instance, as good as any.) Of these he would have a full and careful analysis made, exhibiting not the entire character, but the several features and individual peculiarities of mind and disposition which make it up, (*imaginum ipsarum lineæ et ductus magis simplices,*) with their connexion and bearing one upon another:—a kind of moral and mental anatomy, as a basis for a system of moral and mental medicine. He prefers the historians to the poets for this purpose, because in the poets the characters are commonly drawn with exaggeration.

[1] *animos plerumque enervare et solvere.*— De Aug.

[2] *statu.* — De Aug.

essentially appertain; as the knowledge of the diversity of grounds and moulds doth to agriculture, and the knowledge of the diversity of complexions and constitutions doth to the physician; except we mean to follow the indiscretion of empirics, which minister the same medicines to all patients.

Another article of this knowledge is the inquiry touching the affections; for as in medicining of the body it is in order first to know the divers complexions and constitutions, secondly the diseases, and lastly the cures; so in medicining of the mind, after knowledge of the divers characters of men's natures, it followeth in order to know the diseases and infirmities of the mind, which are no other than the perturbations and distempers of the affections. For as the ancient politiques[1] in popular estates were wont to compare the people to the sea and the orators to the winds, because as the sea would of itself be calm and quiet if the winds did not move and trouble it, so the people would be peaceable and tractable if the seditious orators did not set them in working and agitation; so it may be fitly said, that the mind in the nature thereof would be temperate and stayed, if the affections, as winds, did not put it into tumult and perturbation. And here again I find strange, as before, that Aristotle should have written divers volumes of Ethics, and never handled the affections, which is the principal subject thereof; and yet in his Rhetorics, where they are considered but collaterally and in a second degree (*as they may be moved by speech*), he findeth place for them, and handleth them well for the quantity; but where their true place is, he pretermitteth them. For it is not his disputations about pleasure and pain that can satisfy this inquiry, no more than he that should generally handle the nature of light can be said to handle the nature of colours; for pleasure and pain are to the particular affections as light is to particular colours. Better travails I suppose had the Stoics taken in this argument, as far as I can gather by that which we have at second hand: but yet it is like it was after their manner, rather in subtilty of definitions (which in a subject of this nature are but curiosities) than in active and ample descriptions and observations. So likewise I find some particular writings of an elegant nature touching some of the affections; as of *anger*, of *comfort upon adverse*

[1] So edd. 1629 and 1633. The original has *in politiques*.

accidents [1], of *tenderness of countenance* [2], and other. But the poets and writers of histories are the best doctors of this knowledge; where we may find painted forth with great life, how affections are kindled and incited; and how pacified and refrained; and how again contained from act and further degree; how they disclose themselves, how they work, how they vary, how they gather and fortify [3], how they are inwrapped one within another, and how they do fight and encounter one with another, and other the like particularities: amongst the which this last is of special use in moral and civil matters; how (I say) to set affection against affection, and to master one by another; even as we use to hunt beast with beast and fly bird with bird, which otherwise percase we could not so easily recover: upon which foundation is erected that excellent use of *præmium* and *pœna*, whereby civil states consist; employing the predominant affections of *fear* and *hope*, for the suppressing and bridling the rest. For as in the government of states it is sometimes necessary to bridle one faction with another, so it is in the government within.

Now come we to those points which are within our own command, and have force and operation upon the mind to affect the will and appetite and to alter manners: wherein they ought to have handled *custom, exercise, habit, education, example, imitation, emulation, company, friends, praise, reproof, exhortation, fame, laws, books, studies:* these as [4] they have determinate use in moralities, from these the mind suffereth, and of these are such receipts and regiments compounded and described, as may seem to recover or preserve the health and good estate of the mind, as far as pertaineth to human medicine: of which number we will visit [5] upon some one or two as an example of the rest, because it were too long to prosecute all; and therefore we do resume Custom and Habit to speak of.

The opinion of Aristotle seemeth to me a negligent opinion, that of those things which consist by nature nothing can be changed by custom; using for example, that if a stone be

[1] This is omitted in the translation.

[2] This I suppose is what the French call *mauvaise honte*. The translation is *De inutili verecundia*, which is the Latin rendering of *περὶ δυσωπίας*, the title of a tract by Plutarch.

[3] This is omitted in the translation.

[4] So in all the editions. Perhaps it should be *are*. (*Hæc enim sunt illa quæ regnant in moralibus.*) If *as* be right, we should probably read, *far from these* &c.

[5] So the original. Edd. 1629 and 1633 have *insist:* perhaps rightly. The translation has *unum aut alterum deligemus in quibus paullulum immorabimur.*

thrown ten thousand times up, it will not learn to ascend; and that by often seeing or hearing, we do not learn to see or hear the better. For though this principle be true in things wherein nature is *peremptory*, (the reason whereof we cannot now stand to discuss,) yet it is otherwise in things wherein nature admitteth *a latitude*. For he might see that a strait glove will come more easily on with use, and that a wand will by use bend otherwise than it grew, and that by use of the voice we speak louder and stronger, and that by use of enduring heat or cold we endure it the better, and the like: which later sort have a nearer resemblance unto that subject of manners he handleth than those instances which he allegeth. But allowing his conclusion, *that virtues and vices consist in habit*, he ought so much the more to have taught the manner of superinducing that habit: for there be many precepts of the wise ordering the exercises of the mind, as there is of ordering the exercises of the body; whereof we will recite a few.

The first shall be, that we beware we take not at the first either too *high* a strain or too *weak*: for if too high, in a diffident[1] nature you discourage; in a confident nature you breed an opinion of facility, and so a sloth; and in all natures you breed a further expectation than can hold out, and so an insatisfaction[2] on the end: if too weak of the other side, you may not look to perform and overcome any great task.

Another precept is, to practise all things chiefly at two several times, the one when the mind is best disposed, the other when it is worst disposed; that by the one you may gain a great step, by the other you may work out the knots and stonds of the mind, and make the middle times the more easy[3] and pleasant.

Another precept is, that which Aristotle mentioneth by the way, which is to bear ever towards the contrary extreme of that whereunto we are by nature inclined: like unto the rowing against the stream, or making a wand straight by bending[4] him contrary to his natural crookedness.

Another precept is, that the mind is brought to any thing better, and with more sweetness and happiness, if that where-

[1] So edd. 1629 and 1633. The original has *different*.

[2] And thence a discouragement — (*id quod animum semper dejicit et confundit*).

[3] So edd. 1629 and 1633. The original has *easily*. Possibly Bacon wrote *run more easily*. The translation has *facile et placide delabentur*. This part of the original edition is carelessly printed.

[4] So ed. 1633. The original has *bynding*, and ed. 1629 *binding*.

unto you pretend be not first in the intention, but *tanquam aliud agendo,* because of the natural hatred of the mind against necessity and constraint. Many other axioms there are touching the managing of *Exercise* and *Custom;* which being so conducted, doth prove indeed another nature; but being governed by chance, doth commonly prove but an ape of nature, and bringeth forth that which is lame and counterfeit.

So if we should handle *books* and *studies,* and what influence and operation they have upon manners, are there not divers precepts of great caution and direction appertaining thereunto? Did not one of the fathers in great indignation call Poesy *vinum dæmonum,* because it increaseth temptations, perturbations, and vain opinions? Is not the opinion of Aristotle worthy to be regarded, wherein he saith that young men are no fit auditors of moral philosophy [1], because they are not settled from the boiling heat of their affections, nor attempered with time and experience? And doth it not hereof come, that those excellent books and discourses of the ancient writers (whereby they have persuaded unto virtue most effectually, by representing her in state and majesty, and popular opinions against virtue in their parasites' coats, fit to be scorned and derided,) are of so little effect towards honesty of life, because they are not read and revolved by men in their mature and settled years, but confined almost to boys and beginners? But is it not true also, that much less young men are fit auditors of matters of policy, till they have been throughly seasoned in religion and morality; lest their judgments be corrupted, and made apt to think that there are no true differences of things, but according to utility and fortune; as the verse describes it, *Prosperum et felix scelus virtus vocatur;* [a crime that is successful is called a virtue;] and again, *Ille crucem pretium sceleris tulit, hic diadema;* [the same crime is rewarded in one man with a gibbet and in another with a crown;] which the poets do speak satirically, and in indignation on virtue's behalf; but books of policy do speak it seriously and positively; for so it pleaseth Machiavel to say, *that if Cæsar had been overthrown*

[1] Not of *moral* but of *political* philosophy. See Mr. Ellis's note, Vol. I. p. 739. That in the passage there quoted from Troilus and Cressida the observation and the error were both derived directly from the *Advancement of Learning* admits of little doubt. But how came Virgilio Malvezzi, in his *Discorsi sopra Cornelio Tacito* published in 1622, to make the same mistake? "E non è discordante da questa mia opinione Aristotele, il qual dice, che i giovani non sono buoni ascultatori delle *morali.*" I quote from ed. 1635. The passage occurs in the address to the reader, p. 3.

he would have been more odious than ever was Catiline; as if there had been no difference but in fortune, between a very fury of lust and blood, and the most excellent spirit (his ambition reserved) of the world? Again, is there not a caution likewise to be given of the doctrines of moralities themselves (some kinds of them,) lest they make men too precise, arrogant, incompatible; as Cicero saith of Cato, *In Marco Catone hæc bona quæ videmus divina et egregia, ipsius scitote esse propria; quæ nonnunquam requirimus, ea sunt omnia non a naturâ, sed a magistro:* [his excellencies were his own, his defects came from the school-master]? Many other axioms and advices there are touching those proprieties and effects which studies do infuse and instil into manners. And so likewise is there touching the use of all those other points, of company, fame, laws, and the rest, which we recited in the beginning in the doctrine of morality.

But there is a kind of Culture of the Mind that seemeth yet more accurate and elaborate than the rest, and is built upon this ground; that the minds of all men are at some times in a state more perfect, and at other times in a state more depraved. The purpose therefore of this practice[1] is to fix and cherish the good hours of the mind, and to obliterate and take forth the evil. The fixing of the good hath been practised by two means; vows or constant resolutions; and observances or exercises; which are not to be regarded so much in themselves, as because they keep the mind in continual obedience. The obliteration of the evil hath been practised by two means; some kind of redemption or expiation of that which is past; and an inception or account *de novo* for the time to come. But this part seemeth sacred and religious, and justly; for all good Moral Philosophy (as was said) is but an handmaid to religion.

Wherefore we will conclude with that last point which is of all other means the most compendious and summary, and again the most noble and effectual, to the reducing of the mind unto virtue and good estate; which is the electing and propounding unto a man's self good and virtuous ends of his life, such as may be in a reasonable sort within his compass to attain. For if these two things be supposed, that a man set before him honest and good ends, and again that he be resolute, constant,

[1] *i. e.* method of culture (*hujus culturæ intentio et institutum*).

and true unto them, it will follow that he shall mould himself into all virtue at once. And this is indeed like the work of nature; whereas the other course is like the work of the hand. For as when a carver makes an image, he shapes only that part whereupon he worketh; as if he be upon the face, that part which shall be the body is but a rude stone still, till such times as he comes to it; but contrariwise when nature makes a flower or living creature, she formeth rudiments of all the parts at one time; so in obtaining virtue by *habit*, while a man practiseth temperance, he doth not profit much to fortitude, nor the like; but when he dedicateth and applieth himself to *good ends*, look what virtue soever the pursuit and passage towards those ends doth commend unto him, he is invested of a precedent disposition to conform himself thereunto; which state of mind Aristotle doth excellently express himself, that it ought not to be called *virtuous*, but *divine:* his words are these: *Immanitati autem consentaneum est opponere eam, quæ supra humanitatem est, heroicam sive divinam virtutem:* and a little after, *Nam ut feræ neque vitium neque virtus est, sic neque Dei: sed hic quidem status altius quiddam virtute est, ille aliud quiddam a vitio:* [that which answers to the brutal degree of vice is the heroical or divine degree of virtue. . . . For as neither virtue nor vice can be predicated of a brute, so neither can it of a God: the divine condition being something higher than virtue, the brutal something different from vice]. And therefore we may see what celsitude of honour Plinius Secundus attributeth to Trajan in his funeral oration[1], where he said, *that men needed to make no other prayers to the gods, but that they would continue as good lords to them as Trajan had been;* as if he had not been only an imitation of divine nature, but a pattern of it. But these be heathen and profane passages, having but a shadow of that divine state of mind which religion and the holy faith doth conduct men unto, by imprinting upon their souls Charity, which is excellently called the bond of Perfection, because it comprehendeth and fasteneth all virtues together. And as[2] it is elegantly said by Menander of vain love, which is but a false imitation of divine love, *Amor melior sophista lævo ad humanam vitam*, that love teacheth a man to carry himself better than the sophist or preceptor, which he calleth *left-handed*, because

[1] The words "funeral oration" are omitted in the translation. It was not a funeral oration, but a Panegyric spoken in Trajan's presence. See above, p. 430.

[2] So edd. 1629 and 1633. The original omits *as*.

with all his rules and preceptions he cannot form a man so *dexterously*, nor with that facility to prize himself and govern himself, as love can do; so certainly if a man's mind be truly inflamed with charity, it doth work him suddenly into greater perfection than all the doctrine of morality can do, which is but a sophist in comparison of the other. Nay further, as Xenophon observed truly that all other affections, though they raise the mind, yet they do it by distorting and uncomeliness of ecstasies or excesses; but only love doth exalt the mind, and nevertheless at the same instant doth settle and compose it; so in all other excellencies, though they advance nature, yet they are subject to excess; only charity admitteth no excess: for so we see, aspiring to be like God in power, the angels transgressed and fell; *Ascendam, et ero similis Altissimo;* [I will ascend and be like unto the Highest:] by aspiring to be like God in knowledge, man transgressed and fell; *Eritis sicut Dii, scientes bonum et malum;* [ye shall be as Gods, knowing good and evil;] but by aspiring to a similitude of God in goodness or love, neither man nor angel ever transgressed or shall transgress. For unto that imitation we are called: *Diligite inimicos vestros, benefacite eis qui oderunt vos, et orate pro persequentibus et calumniantibus vos, ut sitis filii Patris vestri qui in cœlis est, qui solem suum oriri facit super bonos et malos, et pluit super justos et injustos;* [love your enemies, do good to them that hate you, and pray for them which despitefully use you and persecute you; that ye may be the children of your Father which is in Heaven, who maketh his sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust]. So in the first platform of the divine nature itself, the heathen religion speaketh thus, *Optimus Maximus,* [Best and Greatest:] and the sacred Scriptures thus, *Misericordia ejus super omnia opera ejus,* [his mercy is over all his works].

Wherefore I do conclude this part of moral knowledge, concerning the Culture and Regiment of the Mind; wherein if any man, considering the parts thereof which I have enumerated, do judge that my labour is but to collect into an Art or Science that which hath been pretermitted by others as matter of common sense and experience, he judgeth well. But as Philocrates sported with Demosthenes, *You may not marvel (Athenians,) that Demosthenes and I do differ, for he drinketh water, and I drink wine;* and like as we read of an ancient parable of *the two gates of sleep,*

Sunt geminæ somni portæ: quarum altera fertur
Cornea, qua veris facilis datur exitus umbris:
Altera candenti perfecta nitens elephanto,
Sed falsa ad cœlum mittunt insomnia manes:

[Two gates there are of sleep; of horn the one,
By which the true shades pass; of ivory
Burnished and white the other, but through it
Into the upper world false dreams are sent:]

so if we put on sobriety and attention, we shall find it a sure maxim in knowledge, that the more pleasant liquor (*of wine*) is the more vaporous, and the braver gate (*of ivory*) sendeth forth the falser dreams.[1]

But we have now concluded *that general part of Human Philosophy, which contemplateth man segregate, and as he consisteth of body and spirit.* Wherein we may further note, that there seemeth to be a relation or conformity between the good of the mind and the good of the body. For as we divided the good of the body into *health, beauty, strength,* and *pleasure;* so the good of the mind, inquired in rational and moral knowledges[2], tendeth to this, to make the mind *sound,* and without perturbation; *beautiful,* and graced with decency; and *strong* and *agile* for all duties of life. These three, as in the body so in the mind, seldom meet, and commonly sever. For it is easy to observe that many have strength of wit and courage, but have neither health from perturbations, nor any beauty or decency in their doings: some again have an elegancy and fineness of carriage, which have neither soundness of honesty, nor substance of sufficiency: and some again have honest and reformed minds, that can neither become themselves nor manage business: and sometimes two of them meet, and rarely all three. As for pleasure, we have likewise determined that the mind ought not to be reduced to stupid, but to retain pleasure;

[1] The allusion to Philocrates and Demosthenes and to the difference between wine and water is omitted in the translation; probably because Bacon had since used the same illustration in an opposite sense (see *Nov. Org.* i. 123.), taking the wine to represent his own philosophy, with its variety of material and elaborate processes of manufacture, and the water to represent the popular philosophy of his time which was content with what came; and the present passage reads the clearer and better for the omission. After "he judgeth well," yet let him remember (he says) that the object I am in pursuit of is not beauty and fair appearance, but utility and truth; and let him a little call to mind the meaning of that ancient parable, *Sunt geminæ somni portæ,* &c. Great no doubt is the magnificence of the ivory gate, but the true dreams pass by the gate of horn.

[2] *i. e.* considered with reference to reason and morals — (*si juxta moralis doctrinæ scita illud contemplemur*).

confined rather in the subject of it, than in the strength and vigour of it.[1]

¶[2] Civil Knowledge is conversant about a subject which of all others is most immersed in matter, and hardliest reduced to axiom. Nevertheless, as Cato the censor said, *That the Romans were like sheep, for that a man might better drive a flock of them, than one of them; for in a flock, if you could get but some few go right, the rest would follow:* so in that respect moral philosophy is more difficile than policy. Again, moral philosophy propoundeth to itself the framing of internal goodness; but civil knowledge requireth only an external goodness; for that as to society sufficeth; and therefore it cometh oft to pass that there be evil times in good governments: for so we find in the holy story, when the kings were good, yet it is added, *Sed adhuc populus non direxerat*[3] *cor suum ad Dominum Deum patrum suorum;* [but as yet the people had not turned their hearts towards the Lord God of their fathers]. Again, States, as great engines, move slowly, and are not so soon put out of frame: for as in Egypt the seven good years sustained the seven bad, so governments for a time well grounded do bear out errors following: but the resolution of particular persons is more suddenly subverted. These respects do somewhat qualify the extreme difficulty of civil knowledge.

This knowledge hath three parts, according to the three summary actions of society; which are Conversation, Negotiation, and Government. For man seeketh in society comfort, use, and protection: and they be three wisdoms of divers natures, which do often sever; wisdom of the behaviour, wisdom of business, and wisdom of state.

The wisdom of Conversation ought not to be over much affected, but much less despised; for it hath not only an honour in itself, but an influence also into business and government.[4] The poet saith,

[1] For in a mind properly disposed, the act and exercise of virtue ought to be accompanied with a sense of pleasure; as is more clearly expressed in the translation. There are some, he says, who have both health, beauty, and strength of mind; and so perform their duties well; but, from a kind of Stoical severity and insensibility, take no pleasure in them (*sed tamen Stoica quadam tristitia et stupiditate præditi, virtutis quidem actiones exercent, gaudiis non perfruuntur*).

[2] De Aug. viii. 1.

[3] *dixerat* in the original and also in edd. 1629 and 1633. *direxerat.*—De Aug.

[4] In the translation he compares the value of Conversation in business to that of action in oratory.

Nec vultu destrue verba tuo:

a man may destroy the force of his words with his countenance: so may he of his deeds, saith Cicero; recommending to his brother affability and easy access; *Nil interest habere ostium apertum, vultum clausum;* it is nothing won to admit men with an open door, and to receive them with a shut and reserved countenance. So we see Atticus, before the first interview between Cæsar and Cicero, the war depending, did seriously advise Cicero touching the composing and ordering of his countenance and gesture. And if the government of the countenance be of such effect, much more is that of the speech, and other carriage appertaining to conversation; the true model whereof seemeth to me well expressed by Livy, though not meant for this purpose; *Ne aut arrogans videar, aut obnoxius; quorum alterum est alienæ libertatis obliti, alterum suæ:* the sum of behaviour is to retain a man's own dignity, without intruding upon the liberty of others. On the other side, if behaviour and outward carriage be intended too much, first it may pass into affection[1], and then *quid deformius quam scenam in vitam transferre,* [what more unseemly than to be always playing a part;] to act a man's life? But although it proceed not to that extreme, yet it consumeth time, and employeth the mind too much. And therefore as we use to advise young students from company keeping, by saying, *Amici fures temporis,* [friends are thieves of time;] so certainly the intending of the discretion of behaviour is a great thief of meditation. Again, such as are accomplished in that honor[2] of urbanity please themselves in name[3], and seldom aspire to higher virtue; whereas those that have defect in it do seek comeliness by reputation: for where reputation is, almost every thing becometh; but where that is not, it must be supplied by *puntos* and compliments. Again, there is no

[1] So the original. Edd. 1629 and 1633 have *affectation;* which is the more modern form of the word. But the other was I think the more common when the *Advancement* was written.

[2] *howr* in original: *hour* in ed. 1633. Ed. 1629 has *forme;* which is the reading of all the modern editions. But *fourme* could not easily be mistaken for *howr*, whereas *honor* carelessly written would be hardly distinguishable from it. The translation also, though the expression is altered, preserves the idea of honour. *Qui primas adeo in urbanitate obtinent et ad hanc rem unam quasi nati videntur.*

[3] So both the original and ed. 1633. Ed. 1629 has "in *it;*" which has been followed by modern editors. The translation has *ut sibi ipsis in illa sola complaceant.* If *name* be the right word (which I doubt) the meaning must be that they are satisfied with the good report which it procures them. Perhaps it should be "please themselves in the same."

greater impediment of action than an over-curious observance of decency, and the guide of decency, which is time and season. For as Salomon sayeth, *Qui respicit ad ventos, non seminat; et qui respicit ad nubes, non metet;* [he that looketh to the winds doth not sow, and he that regardeth the clouds shall not reap:] a man must make his opportunity, as oft as find it. To conclude; Behaviour seemeth to me as a garment of the mind, and to have the conditions of a garment. For it ought to be made in fashion; it ought not to be too curious; it ought to be shaped so as to set forth any good making of the mind, and hide any deformity; and above all, it ought not to be too strait or restrained for exercise or motion. But this part of civil knowledge hath been elegantly handled, and therefore I cannot report it for deficient.

¶ [1] The wisdom touching Negotiation or Business hath not been hitherto collected into writing, to the great derogation of learning and the professors of learning. For from this root springeth chiefly that note or opinion, which by us is expressed in adage to this effect, that there is no great concurrence between learning and wisdom. For of the three wisdoms which we have set down to pertain to civil life, for wisdom of Behaviour, it is by learned men for the most part despised, as an inferior to virtue and an enemy to meditation; for wisdom of Government, they acquit themselves well when they are called to it, but that happeneth to few; but for the wisdom of Business, wherein man's life is most conversant, there be no books of it, except some few scattered advertisements, that have no proportion to the magnitude of this subject. For if books were written of this as the other, I doubt not but learned men with mean experience would far excel men of long experience without learning, and outshoot them in their own bow.

Neither needeth it at all to be doubted that this knowledge should be so variable as it falleth not under precept; for it is much less infinite than science of Government, which we see is laboured and in some part reduced. Of this wisdom it seemeth some of the ancient Romans in the saddest and wisest times were professors; for Cicero reporteth that it was then [2] in use for senators that had name and opinion for general wise

[1] De Aug. viii. 2.

[2] *i. e.* in the times of which he writes,—a little before his own. (*paulo ante sua secula.*)

men, as Coruncanius, Curius, Lælius, and many others, to walk at certain hours in the Place, and to give audience to those that would use their advice; and that the particular citizens would resort unto them, and consult with them of the marriage of a daughter, or of the employing of a son, or of a purchase or bargain, or of an accusation, and every other occasion incident to man's life; so as there is a wisdom of counsel and advice even in private causes, arising out of an universal insight into the affairs of the world; which is used indeed upon particular cases[1] propounded, but is gathered by general observation of causes of like nature. For so we see in the book which Q. Cicero[2] writeth to his brother *De petitione consulatus* (being the only book of business that I know written by the ancients), although it concerned a particular action then on foot, yet the substance thereof consisteth of many wise and politic axioms, which contain not a temporary but a perpetual direction in the case of popular elections. But chiefly we may see in those aphorisms which have place amongst divine writings, composed by Salomon the king, of whom the Scriptures testify that his heart was as the sands of the sea, encompassing the world and all worldly matters; we see, I say, not a few profound and excellent cautions, precepts, positions, extending to much variety of occasions; whereupon we will stay awhile, offering to consideration some number of examples.[3]

Sed et cunctis sermonibus qui dicuntur ne accommodes aurem tuam, ne forte audias servum tuum maledicentem tibi. [Hearken not unto all words that are spoken, lest thou hear thy servant curse thee.] Here is concluded the provident stay of inquiry of that which we would be loth to find:[4] as it was judged great wisdom in Pompeius Magnus that he burned Sertorius' papers unperused.

Vir sapiens si cum stulto contenderit, sive irascatur sive rideat, non inveniet requiem. [A wise man if he contend with a fool, whether he be angry or whether he laugh, shall find no rest.] Here is described the great disadvantage which a wise man hath in undertaking a lighter person than himself; which is such an engagement as whether a man turn the

[1] So the original. Edd. 1629 and 1633 have *causes*.

[2] So edd. 1629 and 1633 and *De Aug.* The original omits *Q.*

[3] This is what he calls in the translation *Doctrina de Negotiis Sparsis.* The example which follows is greatly enlarged: the number of proverbs commented upon being increased by a third, and the comments being much fuller.

[4] Compare L'Estrange's *Fables and storyes moralized*, vol. ii. p. 6. ed. 1708.

matter to jest, or turn it to heat, or howsoever he change copy, he can no ways quit himself well of it.

Qui delicatè a pueritia nutrit servum suum, postea sentiet eum contumacem. [He that delicately bringeth up his servant from a child shall have him become froward at the length.] Here is signified, that if a man begin too high a pitch in his favours, it doth commonly end in unkindness and unthankfulness.

Vidisti virum velocem in opere suo? Coram regibus stabit, nec erit inter ignobiles. [Seest thou a man that is quick in his business? He shall stand before kings; his place shall not be among mean men.] Here is observed that, of all virtues for rising to honour, quickness of dispatch is the best; for superiors many times love not to have those they employ too deep or too sufficient, but ready and diligent.

Vidi cunctos viventes qui ambulant sub sole, cum adolescente secundo qui consurgit pro eo. [I beheld all the living which walk under the sun, with the second youth that shall stand in his place.] Here is expressed that which was noted by Sylla first, and after him by Tiberius: *Plures adorant solem orientem quam occidentem vel meridianum* [1], [there be more that worship the rising sun than the sun setting or at mid-day].

Si spiritus potestatem habentis ascenderit super te, locum tuum ne dimiseris; quia curatio faciet cessare peccata maxima. [If the spirit of the ruler rise up against thee, leave not thy place; for observance will remove great offences.] Here caution is given that upon displeasure, retiring is of all courses the unfittest; for a man leaveth things at worst, and depriveth himself of means to make them better.

Erat civitas parva, et pauci in ea viri: venit contra eam rex magnus, et vadavit eam, intruxitque munitiones per gyrum, et perfecta est obsidio: inventusque est in ea vir pauper et sapiens, et liberavit eam per sapientiam suam; et nullus deinceps recordatus est hominis illius pauperis. [There was a little city and few men within it; and there came a great king against it and besieged it and raised great bulwarks round about it: and there was found in it a poor wise man, and he by his wisdom delivered the city; yet no man remembered that same poor

[1] The words *vel meridianum* are omitted in the translation; and it is difficult to understand how they got in; for they are not to be found in either of the passages alluded to, and they seem to carry the observation beyond the truth.

man.] Here the corruption[1] of states is set forth, that esteem not virtue or merit longer than they have use of it.

Mollis responsio frangit iram. [A soft answer defeateth wrath.] Here is noted that silence or rough answer exasperateth; but an answer present and temperate pacifieth.

Iter pigrorum quasi sepes spinarum. [The way of the slothful is as an hedge of thorns.] Here is lively represented how laborious sloth proveth in the end; for when things are deferred till the last instant and nothing prepared beforehand, every step findeth a brier or an impediment, which catcheth or stoppeth.

Melior est finis orationis quam principium. [Better is the end of a speech than the beginning thereof.] Here is taxed the vanity of formal speakers, that study more about prefaces and inducements than upon the conclusions and issues of speech.

Qui cognoscit in judicio faciem, non bene facit; iste et pro buccella panis deseret veritatem. [He that respecteth persons in judgment doth not well; even for a piece of bread will that man depart from the truth.] Here is noted, that a judge were better be a briber than a respecter of persons; for a corrupt judge offendeth not so lightly[2] as a facile.

Vir pauper calumnians pauperes similis est imbri vehementi, in quo paratur fames. [A poor man that beareth witness against the poor is like a sweeping rain which leaveth no food.] Here is expressed the extremity of necessitous extortions, figured in the ancient fable of the full and hungry horse-leech.

Fons turbatus pede, et vena corrupta, est justus cadens coram impio. [A righteous man falling down before the wicked is as a troubled fountain and a corrupt spring.] Here is noted, that one judicial and exemplar iniquity in the face of the world, doth trouble the fountains of justice more than many particular injuries passed over by connivance.

[3] *Qui subtrahit aliquid a patre et a matre, et dicit hoc non esse peccatum, particeps est homicidii.* [Whoso robbeth his father and his mother, and saith it is no transgression, is the companion of a destroyer.] Here is noted, that whereas men in

[1] So edd. 1629 and 1633. The original has *corruptions.*

[2] So the original. Edd. 1629 and 1633 have *highly:* a conjectural emendation probably, by some critic who did not know that *lightly* meant *easily, readily, upon slight occasion*; or did not observe that the point of the observation rests entirely upon this word. The corrupt judge does not offend less highly than the facile; but less frequently.

[3] This proverb is omitted in the translation.

wronging their best friends use to extenuate their fault, as if they might presume or be bold upon them, it doth contrariwise indeed aggravate their fault, and turneth it from injury to impiety.

Noli esse amicus homini iracundo, nec ambulato cum homine furioso. [Make no friendship with an angry man, neither go with a furious man.] Here caution is given, that in the election of our friends we do principally avoid those which are impatient, as those that will espouse us to many factions and quarrels.

Qui conturbat domum suam, possidebit ventum. [He that troubleth his own house shall inherit the wind.] Here is noted, that in domestical separations and breaches men do promise to themselves quieting of their mind and contentment; but still they are deceived of their expectation, and it turneth to wind.

Filius sapiens lætificat patrem: filius vero stultus mœstitia est matri suæ. [A wise son maketh a glad father, but a foolish son is the heaviness of his mother.] Here is distinguished, that fathers have most comfort of the good proof of their sons; but mothers have most discomfort of their ill proof, because women have little discerning of virtue, but of fortune.[1]

Qui celat delictum, quærit amicitiam; sed qui altero sermone repetit, separat fœderatos. [He that covereth a transgression seeketh love, but he that repeateth a matter separateth very friends.] Here caution is given, that reconcilement is better managed by an *amnesty*, and passing over that which is past, than by apologies and excusations.

In omni opere bono erit abundantia; ubi autem verba sunt plurima, ibi frequenter egestas. [In every good work there shall be abundance, but where there are many words there is penury.] Here is noted that words and discourse abound most where there is idleness and want.

Primus in sua causa justus; sed venit altera pars, et inquirit in eum. [He that is first in his own cause seemeth just; but the other party cometh and searcheth him.] Here is observed,

[1] In the translation he adds two other causes—the greater tenderness of the mother's affection, and (perhaps) a consciousness that her own indulgence has spoiled her son; and instead of saying that the mother has "little discerning of virtue," he only says that the father understands its value better. The allusion to fortune is omitted altogether; and indeed it is not easy to see how it bears upon the case in point; the son in question being by the supposition not unfortunate but foolish. I thought it right to mention this alteration, because it is more than a development of the remark in the text; it is a correction of the opinion implied in it.

that in all causes the first tale possesseth much; in sort[1] that the prejudice thereby wrought will be hardly removed, except some abuse or falsity in the information be detected.

[2] *Verba bilinguis quasi simplicia, et ipsa perveniunt ad interiora ventris.* [The words of the double-tongued man which seem artless are they that go down to the innermost parts of the belly.] Here is distinguished, that flattery and insinuation which seemeth set and artificial sinketh not far; but that entereth deep which hath shew of nature, liberty, and simplicity.

Qui erudit derisorem, ipse sibi injuriam facit; et qui arguit impium, sibi maculam generat. [He that reproveth a scorner doth himself wrong, and he that rebuketh a wicked man getteth himself a blot.] Here caution is given how we tender reprehension to arrogant and scornful natures, whose manner is to esteem it for contumely, and accordingly to return it.

Da sapienti occasionem, et addetur ei sapientia. [Give opportunity to a wise man, and he will be yet wiser.] Here is distinguished the wisdom brought into habit, and that which is but verbal and swimming only in conceit; for the one upon the occasion presented is quickened and redoubled, the other is amazed and confused.

Quomodo in aquis resplendent vultus prospicientium, sic corda hominum manifesta sunt prudentibus. [As the face of one that looketh upon the water is reflected therein, so the hearts of men are manifest unto the wise.] Here the mind of a wise man is compared to a glass, wherein the images of all diversity of natures and customs are represented; from which representation proceedeth that application,

Qui sapit, innumeris moribus aptus erit:

[a wise man will know how to apply himself to all sorts of characters].

Thus have I staid somewhat longer upon these sentences politic of Salomon than is agreeable to the proportion of an example; led with a desire to give authority to this part of knowledge, which I noted as deficient, by so excellent a precedent; and have also attended them with brief observations, such as to my understanding offer no violence to the sense, though I

[1] So the original. Edd. 1629 and 1633 have *in such sort:* an attempt at correction where none was wanted.

[2] This proverb is omitted in the translation.

know they may be applied to a more divine use: but it is allowed even in divinity, that some interpretations, yea and some writings, have more of the Eagle than others. But taking them as instructions for life, they might have received large discourse, if I would have broken them and illustrated them by deducements and examples.

Neither was this in use only with the Hebrews; but it is generally to be found in the wisdom of the more ancient times, that as men found out any observation that they thought was good for life, they would gather it and express it in parable or aphorism or fable. But for fables, they were vicegerents and supplies where examples failed: now that the times abound with history, the aim is better when the mark is alive. And therefore the form of writing which of all others is fittest for this variable argument of negotiation and occasions is that which Machiavel chose wisely and aptly for government; namely, *discourse upon histories or examples.* For knowledge drawn freshly and in our view out of particulars, knoweth the way best to particulars again. And it hath much greater life for practice when the discourse attendeth upon the example, than when the example attendeth upon the discourse. For this is no point of order, as it seemeth at first, but of substance. For when the example is the ground, being set down in an history at large, it is set down with all circumstances, which may sometimes control the discourse thereupon made and sometimes supply it, as a very pattern for action[1]; whereas the examples alleged for the discourse's sake are cited succinctly and without particularity, and carry a servile aspect toward the discourse which they are brought in to make good.

But this difference is not amiss to be remembered, that as history of Times is the best ground for discourse of government, such as Machiavel handleth, so histories of Lives is the most proper for discourse of business, as[2] more conversant in private actions. Nay there is a ground of discourse for this

[1] So edd. 1629 and 1633. The original has *gaine.* I doubt whether *action* be the right word, and should rather suspect *aime*, which might look very like *gaine* if the tail of a letter from the line above happened to strike through the *a.* The translation has *unde fit loco exemplaris ad imitationem et practicam.*

[2] *is* both in orig. and in edd. 1629 and 1633. Blackbourne substituted *because it is.* Instead of "private actions," the translation substitutes "actions of all kinds great and small"—(*quoniam omnem occasionum et negotiorum, tam grandium quam leviorum, varietatem complectuntur*).

purpose fitter than them both, which is *discourse upon letters*, such as are wise and weighty, as many are of Cicero *ad Atticum* and others. For letters have a great[1] and more particular representation of business than either Chronicles or Lives. Thus have we spoken both of the matter and form of this part of civil knowledge touching Negotiation[2], which we note to be deficient.

But yet there is another part of this part, which differeth as much from that whereof we have spoken as *sapere* and *sibi sapere*, [*to be wise* and *to be wise for oneself*,] the one moving as it were to the circumference, the other to the centre. For there is a wisdom of counsel, and again there is a wisdom of pressing a man's own fortune; and they do sometimes meet, and often sever. For many are wise in their own ways that are weak for government or counsel; like ants, which is a wise creature for itself, but very hurtful for the garden. This wisdom the Romans did take much knowledge of[3]: *Nam pol sapiens* (saith the comical poet) *fingit fortunam sibi*, [the wise man fashions his fortune for himself;] and it grew to an adage, *Faber quisque fortunæ propriæ*, [every man has tools to make his own fortune with,] and Livy attributeth it to Cato the first, *In hoc viro tanta vis animi et ingenii inerat, ut quocunque loco natus esset, sibi ipse fortunam facturus videretur*, [such was his force of mind and genius that in whatever state he had been born he would have made himself a fortune].

This conceit or position[4] if it be too much declared and professed, hath been thought a thing impolitic and unlucky; as was observed in Timotheus the Athenian; who having done many great services to the estate in his government, and giving an account thereof to the people as the manner was, did conclude every particular with this clause, and in this fortune had no part. And it came so to pass that he never prospered in any thing he took in hand afterward: for this is too high and too arrogant, savouring of that which Ezekiel saith of Pharaoh, *Dicis, Fluvius est meus, et ego feci memet ipsum*, [thou sayest

[1] So all three editions, though *great* can hardly be the right word. I should suspect *nearer*. The translation has *magis in proximo et ad vivum negotia solent repræsentare.*

[2] i. e *de negotiis sparsis.*

[3] And yet (he adds in the translation) there were no better patriots, — *licet patriæ optimis curatoribus.*

[4] The translation has *hoc genus prudentiæ.*

the river is mine, and I made myself;] or of that which another prophet speaketh, that men offer sacrifices to their nets and snares; and that which the poet expresseth,

> Dextra mihi Deus, et telum quod missile[1] libro,
> Nunc adsint!

[my right hand and my spear are the God I trust in]. For these confidences were ever unhallowed, and unblessed. And therefore those that were great politiques indeed ever ascribed their successes to their felicity, and not to their skill or virtue. For so Sylla surnamed himself *Felix*, not *Magnus*, [the Fortunate, not the Great]. So Cæsar said[2] to the master of the ship, *Cæsarem portas et fortunam ejus*, [you carry Cæsar and his fortune].

But yet nevertheless these positions, *Faber quisque fortunæ suæ; Sapiens dominabitur astris; Invia virtuti nulla est via;* [every man should be the maker of his own fortune; the wise man will command his stars; nothing impossible to virtue:] and the like, being taken and used as spurs to industry, and not as stirrups to insolency, rather for resolution than for presumption or outward declaration, have been ever thought sound and good, and are no question imprinted in the greatest minds; who are so sensible of this opinion as they can scarce contain it within. As we see in Augustus Cæsar, (who was rather diverse from his uncle than inferior in virtue[3],) how when he died, he desired his friends about him to give him a *Plaudite;* as if he were conscient to himself that he had played his part well upon the stage. This part of knowledge we do report also as deficient: not but that it is practised too much, but it hath not been reduced to writing. And therefore lest it should seem to any that it is not com-

Faber Fortunæ, sive de Ambitu vitæ.

[1] *inutile* in the original, and also in ed. 1633: obviously a misprint. Ed. 1629 and the *De Augmentis* have it right.

In addition to these instances he cites in the translation another from Julius Cæsar himself. When the soothsayer reported the auspices unfavourable, he was heard to mutter "they will be more favourable when I will." The anecdote comes from Suetonius. It was the only occasion (Bacon adds) on which Cæsar so far forgot himself as to betray his secret thoughts — (*nunquam, quod memini, impotentiam cogitationum suarum arcanarum prodidit nisi simili dicto*); and his death followed soon after.

[2] better (adds the translation) than in the instance above mentioned.

[3] *sed vir certe paulo moderatior.* In Bacon's character of Augustus—the fragment entitled *Imago Civilis Augusti Cæsaris*—he acknowledges that he was inferior to Julius in strength of mind, but asserts that he was superior in beauty and health of mind; Julius's aspirations being restless, boundless, and inordinate; those of Augustus sober, well ordered, and within compass.

prehensible by axiom, it is requisite, as we did in the former, that we set down some heads or passages of it.

Wherein it may appear at the first a new and unwonted argument to teach men how to raise and make their fortune; a doctrine wherein every man perchance will be ready to yield himself a disciple, till he see the difficulty: for Fortune layeth as heavy impositions as Virtue; and it is as hard and severe a thing to be a true politique, as to be truly moral. But the handling hereof concerneth learning greatly, both in honour and in substance: in honour, because pragmatical men may not go away with an opinion that learning is like a lark, that can mount and sing and please herself, and nothing else; but may know that she holdeth as well of the hawk, that can soar aloft, and can also descend and strike upon the prey: in substance, because it is the perfect law of inquiry of truth, *that nothing be in the globe of matter, which should not be likewise in the globe of crystal, or form;* that is that there be not any thing in being and action, which should not be drawn and collected into contemplation and doctrine. Neither doth learning admire or esteem of this architecture of fortune otherwise than as of an inferior work: for no man's fortune can be an end worthy of his being, and many times the worthiest men do abandon their fortune willingly for better respects: but nevertheless fortune as an organ of virtue and merit deserveth the consideration.

First therefore, the precept which I conceive to be most summary towards the prevailing in fortune, is to obtain that window which Momus did require, who seeing in the frame of man's heart such angles and recesses, found fault there was not a window to look into them; that is, to procure good informations of particulars touching persons, their natures, their desires and ends, their customs and fashions, their helps and advantages, and whereby they chiefly stand; so again their weaknesses and disadvantages, and where they lie most open and obnoxious; their friends, factions, dependances; and again their opposites, enviers, competitors, their moods and times, *Sola viri molles aditus et tempora noras;* their principles, rules, and observations, and the like: and this not only of persons, but of actions; what are on foot from time to time, and how they are conducted, favoured, opposed; and how they import, and the like. For the knowledge of present actions is

not only material in itself, but without it also the knowledge of persons is very erroneous: for men change with the actions; and whiles they are in pursuit they are one, and when they return to their nature they are another. These informations of particulars touching persons and actions are as the minor propositions in every active syllogism; for no excellency of observations (which are as the major propositions) can suffice to ground a conclusion, if there be error and mistaking in the minors.

That this knowledge is possible, Salomon is our surety; who saith, *Consilium in corde viri tanquam aqua profunda; sed vir prudens exhauriet illud*, [counsel in the heart of man is like deep water; but a man of understanding will draw it out]. And although the knowledge itself falleth not under precept, because it is of individuals, yet the instructions for the obtaining of it may.

We will begin therefore with this precept, according to the ancient opinion, that the sinews of wisdom are slowness of belief and distrust; that more trust be given to countenances and deeds than to words; and in words, rather to sudden passages and surprised words, than to set and purposed words. Neither let that be feared which is said, *fronti nulla fides*, [no trusting to the face:] which is meant of a general outward behaviour, and not of the private and subtile motions and labours of the countenance and gesture; which as Q. Cicero elegantly saith, is *animi janua*, the gate of the mind. None more close than Tiberius, and yet Tacitus saith of Gallus, *Etenim vultu offensionem conjectaverat*, [he had seen displeasure in his countenance]. So again, noting the differing character and manner of his commending Germanicus and Drusus in the senate, he saith touching his fashion wherein he carried his speech of Germanicus, thus; *Magis in speciem adornatis verbis, quam ut penitus sentire videretur*, [it was in words too laboured and specious to be taken for what he really felt;] but of Drusus thus; *Paucioribus, sed intentior, et fida oratione*, [he said less, but more earnestly, and in a style of sincerity;] and in another place, speaking of his character of speech when he did any thing that was gracious and popular, he saith that in other things he was *velut eluctantium verborum*, [of a kind of struggling speech;] but then again, *solutius loquebatur quando subveniret*, [he spoke with more freedom when he was speaking in a

man's favour]. So that there is no such artificer of dissimulation, nor no such commanded countenance (*vultus jussus*) that can sever from a feigned tale some of these fashions, either a more slight and careless fashion, or more set and formal, or more tedious and wandering, or coming from a man more drily and hardly.

Neither are *deeds* such assured pledges, as that they may be trusted without a judicious consideration of their magnitude and nature: *Fraus sibi in parvis fidem præstruit, ut majore emolumento fallat,* [it is a trick of treachery to win itself credit at the first by fidelity in small things, that being thereupon trusted in greater it may deceive with more advantage;] and the Italian thinketh himself upon the point to be bought and sold, when he is better used than he was wont to be without manifest cause. For small favours, they do but lull men asleep, both as to caution and as to industry, and are as Demosthenes calleth them, *Alimenta socordiæ,* [sops to feed sloth]. So again we see how false the nature of some deeds are, in that particular which Mutianus practised upon Antonius Primus, upon that hollow and unfaithful reconcilement which was made between them; whereupon Mutianus advanced many of the friends of Antonius: *simul amicis ejus præfecturas et tribunatus largitur,* [making them prefects and tribunes:] wherein under pretence to strengthen him, he did desolate him, and won from him his dependances.

As for *words,* (though they be like waters to physicians, full of flattery and uncertainty,) yet they are not to be despised, specially with the advantage of passion and affection. For so we see Tiberius upon a stinging and incensing speech of Agrippina came a step forth of his dissimulation, when he said, *You are hurt because you do not reign;* of which Tacitus saith, *Audita hæc raram occulti pectoris vocem elicuere; correptamque Græco versu admonuit, ideo lædi quia non regnaret,* [these words drew from Tiberius the voice, so rarely heard, of his secret heart: he retorted upon her with a Greek verse, that she was hurt, &c.]. And therefore the poet doth elegantly call passions tortures, that urge men to confess their secrets:

Vino tortus et ira.

And experience sheweth, there are few men so true to themselves and so settled, but that, sometimes upon heat, sometimes

upon bravery, sometimes upon kindness, sometimes upon trouble of mind and weakness, they open themselves; specially if they be put to it with a counter-dissimulation, according to the proverb of Spain, *Di mentira, y sacaras verdad, Tell a lie and find a truth.*

As for the knowing of men which is at second hand from reports; men's weaknesses[1] and faults are best known from their enemies, their virtues and abilities from their friends, their customs and times from their servants, their conceits and opinions from their familiar friends with whom they discourse most. General fame is light, and the opinions conceived by superiors or equals[2] are deceitful; for to such men are more masked: *Verior fama e domesticis emanat*, [the truer kind of report comes from those who see them at home].

But the soundest disclosing and expounding of men is by their natures and ends; wherein the weakest sort of men are best interpreted by their natures, and the wisest by their ends.[3] For it was both pleasantly and wisely said (though I think very untruly) by a nuncio of the pope, returning from a certain nation where he served as lieger; whose opinion being asked touching the appointment of one to go in his place, he wished that in any case they did not send one that was too wise; because no very wise man would ever imagine what they in that country were like to do. And certainly it is an error frequent for men to shoot over, and to suppose deeper ends and more compass reaches than are: the Italian proverb being elegant, and for the most part true:

Di danari, di senno, e di fede,
Cè nè manco che non credi:

There is commonly less money, less wisdom, and less good faith, than men do account upon.

But Princes upon a far other reason are best interpreted by their natures, and private persons by their ends; for princes being at the top of human desires, they have for the most part no particular ends whereto they aspire[4], by distance from which a man might take measure and scale of the rest of their actions

[1] So ed. 1633. The original and ed. 1629 have *weaknesse*.

[2] The translation omits *equals*: a correction no doubt of Bacon's own.

[3] According to the translation, the weaker *and the more simple* by their natures; the wiser *and the more close* by their ends.

[4] *i. e.* not earnestly and constantly—(*ad quos, præsertim vehementer et constanter, aspirent*).

and desires; which is one of the causes that maketh their hearts more inscrutable.[1] Neither is it sufficient to inform ourselves in men's ends and natures of the variety of them only, but also of the predominancy, what humour reigneth most, and what end is principally sought. For so we see, when Tigellinus saw himself outstripped by Petronius Turpilianus in Nero's humours of pleasures, *metus ejus rimatur*[2], he wrought upon Nero's fears, whereby he brake the other's neck.

But to all this part of inquiry the most compendious way resteth in three things. The first, to have general acquaintance and inwardness with those which have general acquaintance and look most into the world; and specially according to the diversity of business and the diversity of persons, to have privacy and conversation with some one friend at least which is perfect and well intelligenced in every several kind. The second is to keep a good mediocrity in liberty of speech and secrecy; in most things liberty; secrecy where it importeth; for liberty of speech inviteth and provoketh liberty to be used again, and so bringeth much to a man's knowledge; and secrecy, on the other side, induceth trust and inwardness. The last is the reducing of a man's self to this watchful and serene habit, as to make account and purpose, in every conference and action, as well to observe as to act. For as Epictetus would have a philosopher in every particular action to say to himself, *Et hoc volo, et etiam institutum servare,* [I would do this and keep my course too;] so a politic man in every thing should say to himself, *Et hoc volo, ac etiam aliquid addiscere,* [I would do it and also learn something from it].[3] I have stayed the longer upon this precept of obtaining good information, because it is a main part by itself, which answereth to all the rest. But, above all things, caution must be taken that men have a good stay and hold of themselves, and that this much knowledge do not draw on much meddling; for nothing is more unfortunate than light and rash intermeddling in many matters; so that this variety of knowledge tendeth in conclusion but

[1] Whereas private persons are almost all like travellers making for their journey's end; and if you know what they are aiming at, you may guess by that what they are likely to do and what not to do.

[2] So edd. 1629 and 1633. The original has *rinaeur*.

[3] *i. e.* something which may be of use hereafter. And therefore (adds the translation) those who are so intent on the business in hand that, like Montaigne, they pay no attention to anything that turns up by the way, make excellent ministers for Kings and Commonwealths, but bad managers of their own fortune.

only to this, to make a better and freer choice of those actions which may concern us, and to conduct them with the less error and the more dexterity.

The second precept concerning this knowledge is, for men to take good information touching their own person, and well to understand themselves: knowing that, as St. James saith, though men look oft in a glass, yet they do suddenly forget themselves; wherein as the divine glass is the word of God, so the politic glass is the state of the world or times wherein we live; in the which we are to behold ourselves.

For men ought to take an unpartial view of their own abilities and virtues; and again of their wants and impediments; accounting these with the most, and those other with the least; and from this view and examination to frame the considerations following.

First, to consider how the constitution of their nature sorteth with the general state of the times; which if they find agreeable and fit, then in all things to give themselves more scope and liberty; but if differing and dissonant, then in the whole course of their life to be more close, retired, and reserved: as we see in Tiberius, who was never seen at a play and came not into the senate in twelve of his last years; whereas Augustus Cæsar lived ever in men's eyes, which Tacitus observeth: *Alia Tiberio morum via,* [Tiberius's ways were different].[1]

Secondly, to consider how their nature sorteth with professions and courses of life, and accordingly to make election, if they be free; and, if engaged, to make the departure at the first opportunity: as we see was done by duke Valentine, that was designed by his father to a sacerdotal profession, but quitted it soon after in regard of his parts and inclination; being such nevertheless, as a man cannot tell well whether they were worse for a prince or for a priest.

Thirdly, to consider how they sort with those whom they are like to have competitors and concurrents, and to take that course wherein there is most solitude, and themselves like to be most eminent: as Cæsar Julius did, who at first was an orator or pleader; but when he saw the excellency of Cicero, Hortensius, Catulus, and others, for eloquence, and saw there was no man of reputation for the wars but Pompeius, upon whom the

[1] In the translation Pericles is mentioned as another instance — (*eadem et Periclis ratio fuit*).

state was forced to rely, he forsook his course begun toward a civil and popular greatness, and transferred his designs to a martial greatness.

Fourthly, in the choice of their friends and dependances, to proceed according to the composition of their own nature; as we may see in Cæsar, all whose friends and followers were men active and effectual, but not solemn or of reputation.[1]

Fifthly, to take special heed how they guide themselves by examples, in thinking they can do as they see others do; whereas perhaps their natures and carriages are far differing; in which error it seemeth Pompey was, of whom Cicero saith, that he was wont often to say, *Sylla potuit, ego non potero?* [Sylla could do it, why not I?] wherein he was much abused, the natures and proceedings of himself and his example being the unlikest in the world; the one being fierce, violent, and pressing the fact; the other solemn, and full of majesty and circumstance, and therefore the less effectual.

But this precept touching the politic knowledge of ourselves hath many other branches whereupon we cannot insist.

Next to the well understanding and discerning of a man's self, there followeth the well opening and revealing[2] a man's self; wherein we see nothing more usual than for the more able man to make the less shew. For there is a great advantage in the well setting forth of a man's virtues, fortunes, merits; and again in the artificial covering of a man's weaknesses, defects, disgraces; staying upon the one, sliding from the other; cherishing the one by circumstances, gracing the other by exposition, and the like: wherein we see what Tacitus saith of Mutianus, who was the greatest politique of his time, *Omnium quæ dixerat feceratque arte quâdam ostentator,* [having a certain art of displaying to advantage all he said and did;] which requireth indeed some art, lest it turn tedious and arrogant; but yet so as ostentation (though it be to the first degree of vanity) seemeth to me rather a vice in manners than in policy: for

[1] And men (the translation adds) who were infinitely loyal to Cæsar himself, but arrogant and contemptuous towards all men else; such as Antonius, Hirtius, Pansa, Oppius, Balbus, Dolabella, Pollio, and the rest.

[2] In the translation this part of the subject is distributed into three separate heads; —the art of setting a man's self forth to advantage (*se ostentare*)—of making himself understood (*se declarare*)—of turning and shaping himself according to occasion (*flectere se et effingere*); and the order of the precepts which follow is changed to suit this arrangement. The three next paragraphs belong to the first head,—the art of ostentation.

as it is said, *Audacter calumniare*[1], *semper aliquid hæret*, [slander boldly, there is ever some that sticks;] so, except it be in a ridiculous degree of deformity, *Audacter te vendita, semper aliquid hæret*, [put forward your own pretensions boldly—something always sticks]. For it will stick with the more ignorant and inferior sort of men, though men of wisdom and rank do smile at it and despise it; and yet the authority won with many doth countervail the disdain of a few. But if it be carried with decency and government, as with a natural, pleasant, and ingenious[2] fashion; or at times when it is mixed with some peril and unsafety, (as in military persons;) or at times when others are most envied; or with easy and careless passage to it and from it, without dwelling too long or being too serious; or with an equal freedom of taxing a man's self as well as gracing himself; or by occasion of repelling or putting down others' injury or insolency; it doth greatly add to reputation: and surely not a few solid natures, that want this ventosity and cannot sail in the height of the winds, are not without some prejudice and disadvantage by their moderation.

But for these flourishes and enhancements of virtue, as they are not perchance unnecessary, so it is at least necessary that virtue be not disvalued and imbased under the just price; which is done in three manners: by offering and obtruding a man's self; wherein men think he is rewarded, when he is accepted: by doing too much[3]; which will not give that which is well done leave to settle, and in the end induceth satiety: and by finding too soon the fruit of a man's virtue, in commendation, applause, honour, favour; wherein if a man be pleased with a little, let him hear what is truly said, *Cave ne insuetus rebus majoribus videaris, si hæc te res parva sicuti magna delectat*, [if he take so much delight in a little thing, he will be thought unused to greater things].

But the covering of defects is of no less importance than the valuing of good parts; which may be done likewise in three manners; by Caution, by Colour, and by Confidence. Caution is when men do ingeniously and discreetly avoid to be put into those things for which they are not proper: whereas contrari-

[1] *calumniari* in the original.

[2] *i. e.* ingenuous.

[3] Especially in the beginning, and at once — (*quando quis in principio rei gerendæ viribus suis nimium abutitur, et quod sensim erat præstandum uno impetu effundit*).

wise bold and unquiet spirits will thrust themselves into matters without difference, and so publish and proclaim all their wants. Colour is when men make a way for themselves to have a construction made of their faults or wants as proceeding from a better cause, or intended for some other purpose: for of the one it is well said, *Sæpe latet vitium proximitate boni,* [a vice will often hide itself under the shadow of a neighbouring virtue;] and therefore whatsoever want a man hath, he must see that he pretend the virtue that shadoweth it; as if he be dull, he must affect gravity; if a coward, mildness; and so the rest: for the second, a man must frame some probable cause why he should not do his best, and why he should dissemble his abilities; and for that purpose must use to dissemble those abilities which are notorious in him [1], to give colour that his true wants are but industries and dissimulations. For Confidence, it is the last [2] but the surest remedy; namely, to depress and seem to despise whatsoever a man cannot attain; observing the good [3] principle of the merchants, who endeavour to raise the price of their own commodities, and to beat down the price of others. But there is a confidence that passeth [4] this other; which is, to face out a man's own defects, in seeming to conceive that he is best in those things wherein he is failing; and, to help that again, to seem on the other side that he hath least opinion of himself in those things wherein he is best: like as we shall see it commonly in poets, that if they shew their verses, and you except to any, they will say *that that line cost them more labour than any of the rest;* and presently will seem to disable and suspect rather some other line, which they know well enough to be the best in the number. But above all, in this righting and helping of a man's self in his own carriage, he must take heed he shew not himself dismantled and exposed to scorn and injury, by too much dulceness, goodness, and facility of nature, but shew some sparkles of liberty, spirit, and edge: which kind of fortified carriage, with a ready rescuing [5] of a man's self from scorns, is sometimes of necessity imposed upon

[1] This clause is omitted in the translation; which says only *ut quod non possimus nolle videamur*).

[2] Meaning, I think, the least worthy — the last to be resorted to. The translation has *impudens certe est remedium, sed tamen* &c.

[3] *i. e.* prudent — *mercatorum prudentium more, quibus solenne est et proprium, ut* &c.

[4] *i. e.* in impudence — (*hoc ipso impudentius*).

[5] So ed. 1633. The original and ed. 1629 have *rescussing*.

men by somewhat in their person or fortune[1]; but it ever succeedeth with good felicity.[2]

Another precept of this knowledge is, by all possible endeavour to frame the mind to be pliant and obedient to occasion; for nothing hindereth men's fortunes so much as this *Idem manebat neque idem decebat*, [continuing the same when the same is no longer fit:] men are where they were, when occasions turn: and therefore to Cato, whom Livy maketh such an architect of fortune, he addeth that he had *versatile ingenium*, [a wit that could turn well]. And thereof it cometh that these grave solemn wits, which must be like themselves and cannot make departures, have more dignity than felicity. But in some it is nature to be somewhat viscous and inwrapped, and not easy to turn. In some it is a conceit that is almost a nature, which is, that men can hardly make themselves believe that they ought to change their course, when they have found good by it in former experience. For Machiavel noteth wisely, how Fabius Maximus would have been temporizing still, according to his old bias, when the nature of the war was altered and required hot pursuit. In some other it is want of point and penetration in their judgment, that they do not discern when things have a period, but come in too late after the occasion; as Demosthenes compareth the people of Athens to country fellows when they play in a fence school, that if they have a blow, then they remove their weapon to that ward, and not before. In some other it is a lothness to leese labours passed, and a conceit that they can bring about occasions to their ply[3]; and yet in the end, when they see no other remedy, then they come to it with disadvantage; as Tarquinius, that gave for the third part of Sibylla's books the treble price, when he might at first have had all three for the simple. But from whatsoever root or cause this restiveness of mind pro-

[1] As in the case of deformed persons, and bastards, and persons disgraced — (*veluti fit in deformibus, et spuriis, et ignominia aliqua mulctatis*).

[2] According to the arrangement adopted in the translation, the observations on the first head — the art of ostentation — end here; and the art of *declaration*, that is of making oneself understood, is next handled. The substance of the remarks on this head will be found in the next page, in the paragraph beginning "Another part of this knowledge is the observing a good mediocrity," &c. Then follows the paragraph, which stands next in the text; which refers to the third head, — *quod ad animum flectendum et effingendum attinet.* And with this he concludes what he has to say of "the two *summary* precepts concerning the architecture of Fortune." The rest he gives as a sample of particular precepts (*præcepta sparsa*) on the same subject.

[3] The rest of this sentence is omitted in the translation.

ceedeth, it is a thing most prejudicial; and nothing is more politic than to make the wheels of our mind concentric and voluble with the wheels of fortune.

[1] Another precept of this knowledge, which hath some affinity with that we last spake of, but with difference, is that which is well expressed, *Fatis accede Deisque,* [take the way which the Fates and the Gods offer;] that men do not only turn with the occasions but also run with the occasions, and not strain their credit or strength to over hard or extreme points, but choose in their actions that which is most passable: for this will preserve men from foil, not occupy them too much about one matter, win opinion of moderation, please the most[2], and make a shew of a perpetual felicity in all they undertake; which cannot but mightily increase reputation.

Another part of this knowledge seemeth to have some repugnancy with the former two, but not as I understand it; and it is that which Demosthenes uttereth in high terms; *Et quemadmodum receptum est, ut exercitum ducat imperator, sic et a cordatis viris res ipsæ ducendæ; ut quæ ipsis videntur, ea gerantur, et non ipsi eventus persequi cogantur;* [as the captain leads the army, so should wise men lead affairs; they should get that done which they think good to be done, and not be forced to follow at the heels of events]. For if we observe, we shall find two differing kinds of sufficiency in managing of business: some can make use of occasions aptly and dexterously, but plot little; some can urge and pursue their own plots well, but cannot accommodate nor take in[3]; either of which is very unperfect without the other.

Another part of this knowledge is the observing a good mediocrity in the declaring or not declaring a man's self: for although depth of secrecy, and making way *qualis est via navis in mari,* [like the way of a ship through the water,] (which the

[1] This, in the translation, stands as the second of the *præcepta sparsa;* that of accustoming the mind to value things according as they conduce to our particular ends being placed first. Throughout this part of the work the meaning is expressed more fully and clearly in the Latin, but where no material alteration or addition is introduced, and where the meaning of the English is plain enough, I do not stay to point out the differences.

[2] That is, I suppose, by bringing us less into collision with them — (*pauciores offendemus*).

[3] So in all three editions, though the sentence seems to be imperfect. The meaning must be that they cannot seize and turn to advantage accidents which fall out unexpectedly in their favour. The translation has *alii toti sunt in machinando, qui occasiones quæ opportune incidunt non arripiunt.*

French calleth *sourdes menées*, when men set things in work without opening themselves at all,) be sometimes both prosperous and admirable; yet many times *Dissimulatio errores parit qui dissimulatorem ipsum illaqueant*, [dissimulation breeds mistakes in which the dissembler himself is caught]. And therefore we see the greatest politiques have in a natural and free manner professed their desires, rather than been reserved and disguised in them. For so we see that Lucius Sylla made a kind of profession, *that he wished all men happy or unhappy as they stood his friends or enemies.* So Cæsar, when he went first into Gaul, made no scruple to profess *that he had rather be first in a village than second at Rome.* So again as soon as he had begun the war, we see what Cicero saith of him; *Alter* (meaning of Cæsar) *non recusat, sed quodammodo postulat, ut* (*ut est*) *sic appelletur tyrannus*, [he does not refuse, but in a manner demands, to be called what he is—tyrant]. So we may see in a letter of Cicero to Atticus, that Augustus Cæsar in his very entrance into affairs, when he was a dearling of the senate, yet in his harangues to the people would swear *Ita parentis honores consequi liceat*, [as I hope to attain my father's honours;] which was no less than the tyranny, save that, to help it he would stretch forth his hand towards a statua of Cæsar's that was erected in the place: and[1] men laughed and wondered and said Is it possible? or Did you ever hear the like[2]? and yet thought[3] he meant no hurt, he did it[4] so handsomely and ingenuously. And all these were prosperous: whereas Pompey, who tended to the same end but in a more dark and dissembling manner, as Tacitus saith of him, *Occultior non melior*, [having his intentions better concealed but not better,] wherein Sallust concurreth, *ore probo, animo inverecundo*, [an honest tongue but a shameless mind,] made it his design by infinite secret engines to cast the state into an absolute anarchy and confusion, that the state might cast itself into his arms for necessity and protection, and so the sovereign power be put upon him, and he never seen in it: and when he had brought it (as he thought) to that point,

[1] So the original; edd. 1629 and 1633 have *whereat many men.*
[2] So the original; edd. 1629 and 1633 have *like to this.*
[3] *though* in orig.
[4] *i. e.* he seemed to say what he felt—(*nihil malitiæ in eo suspicabantur qui tam candide et ingenue quid sentiret loqueretur*).

when he was chosen consul alone, as never any was, yet he could make no great matter of it, because men understood him not; but was fain in the end to go the beaten track of getting arms into his hands, by colour of the doubt of Cæsar's designs: so tedious, casual, and unfortunate are these deep dissimulations; whereof it seemeth Tacitus made this judgment, that they were a cunning of an inferior form in regard of true policy; attributing the one to Augustus, the other to Tiberius, where speaking of Livia he saith, *Et cum artibus mariti simulatione filii bene composita,* [that she was of a happy composition, uniting the arts of her husband with the dissimulation of her son;] for surely the continual habit of dissimulation is but a weak and sluggish cunning, and not greatly politic.

Another precept of this Architecture of Fortune is to accustom our minds to judge of the proportion or value of things as they conduce and are material to our particular ends; and that to do substantially, and not superficially. For we shall find the logical part (as I may term it) of some men's minds good, but the mathematical part erroneous; that is, they can well judge of consequences, but not of proportions and comparison[1]; preferring things of shew and sense before things of substance and effect. So some fall in love with access to princes, others with popular fame and applause, supposing they are things of great purchase; when in many cases they are but matters of envy, peril, and impediment. So some measure things according to the labour and difficulty or assiduity which are spent about them; and think if they be ever moving, that they must needs advance and proceed; as Cæsar saith in a despising manner of Cato the second, when he describeth how laborious and indefatigable he was to no great purpose; *Hæc omnia magno studio agebat.* So in most things men are ready to abuse themselves in thinking the greatest means[2] to be best, when it should be the fittest.

As for the true marshalling of men's pursuits towards their fortune as they are more or less material, I hold them to stand thus. First the amendment of their own minds; for the remove of the impediments of the mind will sooner clear the passages of fortune, than the obtaining fortune will remove the impediments

[1] *De* pretiis *vero imperitissime.* — De Aug.

[2] *i. e.* the greatest persons used as means — (*si magni alicujus aut honorati viri operâ utantur*).

of the mind. In the second place I set down wealth and means; which I know most men would have placed first, because of the general use which it beareth towards all variety of occasions. But that opinion I may condemn with like reason as Machiavel doth that other, that moneys were the sinews of the wars; whereas (saith he) the true sinews of the wars are the sinews of men's arms, that is, a valiant, populous, and military nation; and he voucheth aptly the authority of Solon, who when Crœsus shewed him his treasury of gold said to him, that if another came that had better iron he would be master of his gold. In like manner it may be truly affirmed that it is not moneys that are the sinews of fortune, but it is the sinews and steel of men's minds, wit, courage, audacity, resolution, temper, industry, and the like. In third[1] place I set down reputation, because of the peremptory tides and currents it hath; which if they be not taken in their due time are seldom recovered, it being extreme hard to play an after-game of reputation. And lastly I place honour, which is more easily won by any of the other three, much more by all, than any of them can be purchased by honour. To conclude this precept, as there is order and priority in matter, so is there in time, the preposterous placing whereof is one of the commonest errors; while men fly to their ends when they should intend their beginnings, and do not take things in order of time as they come on, but marshal them according to greatness and not according to instance; not observing the good precept, *Quod nunc instat agamus*,

[Despatch we now what stands us now upon].

Another precept of this knowledge is, not to embrace any matters which do occupy too great a quantity of time, but to have that sounding in a man's ears, *Sed fugit interea, fugit irreparabile tempus*, [while he is making ready to do it the time for doing it is gone;] and that is the cause why those which take their course of rising by professions of burden, as lawyers, orators, painful divines, and the like, are not commonly so politic for their own fortune[2], otherwise than in their ordinary way, because they want time to learn particulars, to wait occasions, and to devise plots.[3]

[1] So the original and ed. 1629. Ed. 1633 has *the third*.

[2] So the original. Edd. 1629 and 1633 have *fortunes*.

[3] Whereas (he adds in the translation) you will find in courts and commonwealths that the best promoters of their own fortune are those who have no public duty to discharge, and make their own rising their only business.

Another precept of this knowledge is to imitate nature which doth nothing in vain; which surely a man may do, if he do well interlace his business, and bend not his mind too much upon that which he principally intendeth.[1] For a man ought in every particular action so to carry the motions of his mind, and so to have one thing under another, as if he cannot have that he seeketh in the best degree, yet to have it in a second, or so in a third; and if he can have no part of that which he purposed, yet to turn the use of it to somewhat else[2]; and if he cannot make any thing of it for the present, yet to make it as a seed of somewhat in time to come; and if he can contrive no effect or substance from it, yet to win some good opinion by it, or the like; so that he should exact an account[3] of himself, of every action to reap somewhat, and not to stand amazed and confused if he fail of that he chiefly meant: for nothing is more impolitic than to mind actions wholly one by one; for he that doth so leeseth infinite occasions which intervene, and are many times more proper and propitious for somewhat that he shall need afterwards, than for that which he urgeth for the present; and therefore men must be perfect in that rule, *Hæc oportet facere, et illa non omittere*, [these things ought ye to do, and not to leave the other undone].

Another precept of this knowledge is, not to engage a man's self peremptorily in any thing, though it seem not liable to accident; but ever to have a window to fly out at, or a way to retire[4]; following the wisdom in the ancient fable of the two frogs, which consulted when their plash was dry whither they should go; and the one moved to go down into a pit, because t was not likely the water would dry there; but the other answered, *True, but if it do, how shall we get out again?*

Another precept of this knowledge is that ancient precept of Bias, construed not to any point of perfidiousness but only to caution and moderation, *Et ama tanquam inimicus futurus, et odi tanquam amaturus*, [love your friend as you would love one who may hereafter be your enemy; hate your enemy as one who may hereafter be your friend;] for it utterly be-

[1] This last clause is omitted in the translation.

[2] *i. e.* to turn his labour taken therein to some other use — (*ad alium quempiam præter destinatum finem operam impensam flectamus*).

[3] So the original. Edd. 1629 and 1633 omit *an*.

[4] The rest of this paragraph is omitted in the translation.

trayeth all utility for men to embark themselves too far in unfortunate friendships, troublesome spleens, and childish and humorous envies or emulations.

But I continue this beyond the measure of an example; led, because I would not have such knowledges which I note as deficient to be thought things imaginative or in the air, or an observation or two much made of; but things of bulk and mass, whereof an end is hardlier made than a beginning. It must be likewise conceived, that in these points which I mention and set down, they are far from complete tractates of them, but only as small pieces for patterns. And lastly, no man I suppose will think that I mean fortunes are not obtained without all this ado; for I know they come tumbling into some men's laps; and a number obtain good fortunes by diligence in a plain way, little intermeddling, and keeping themselves from gross errors.

But as Cicero, when he setteth down an Idea of a perfect Orator, doth not mean that every pleader should be such; and so likewise, when a Prince or a Courtier hath been described by such as have handled those subjects, the mould hath used to be made according to the perfection of the art, and not according to common practice: so I understand it that it ought to be done in the description of a Politic man; I mean politic for his own fortune.

But it must be remembered all this while, that the precepts which we have set down are of that kind which may be counted and called *bonæ artes*, [honest arts]. As for evil arts, if a man would set down for himself that principle of Machiavel, *that a man seek not to attain virtue itself, but the appearance only thereof; because the credit of virtue is a help, but the use of it is cumber;* or that other of his principles, *that he presuppose that men are not fitly to be wrought otherwise but by fear, and therefore that he seek to have every man obnoxious, low, and in strait,* which the Italians call *seminar spine*, to sow thorns; or that other principle contained in the verse which Cicero citeth, *Cadant amici, dummodo inimici intercidant,* [down with friends so enemies go down with them,] as the Triumvirs, which sold every one to other the lives of their friends for the deaths or their enemies; or that other protestation of L. Catilina, to set on fire and trouble states, to the end to fish in droumy waters, and to unwrap their fortunes; *Ego si quid in fortunis*

meis excitatum sit incendium, id non aqua sed ruina restinguam, [if my fortunes be set on fire I will put it out not with water but with demolition:] or that other principle of Lysander *that children are to be deceived with comfits, and men with oaths:* and the like evil and corrupt positions, whereof (as in all things) there are more in number than of the good: certainly with these dispensations from the laws of charity and integrity the pressing of a man's fortune may be more hasty and compendious. But it is in life as it is in ways; the shortest way is commonly the foulest, and surely the fairer way is not much about.

But men if they be in their own power and do bear and sustain themselves, and be not carried away with a whirlwind or tempest of ambition, ought in the pursuit of their own fortune to set before their eyes not only that general map of the world, that *all things are vanity and vexation of spirit,* but many other more particular cards and directions: chiefly that, that Being without well-being is a curse and the greater being the greater curse, and that all virtue is most rewarded and all wickedness most punished in itself: according as the poet saith excellently:

> Quæ vobis, quæ digna, viri, pro laudibus istis
> Præmia posse rear solvi? pulcherrima primum
> Dii *moresque* dabunt vestri:
>
> [What recompence, O friends, can I hold out
> Worthy such deeds? The best is that ye have,—
> God's blessing and your proper nobleness:]

and so of the contrary. And secondly they ought to look up to the eternal providence and divine judgment, which often subverteth the wisdom of evil plots and imaginations, according to that Scripture, *He hath conceived mischief, and shall bring forth a vain thing.* And although men should refrain themselves from injury and evil arts, yet this incessant and sabbathless pursuit of a man's fortune leaveth not tribute which we owe to God of our time; who (we see) demandeth a tenth of our substance, and a seventh, which is more strict, of our time: and it is to small purpose to have an erected face towards heaven, and a perpetual grovelling spirit upon earth, eating dust as doth the serpent; *Atque affigit humo divinæ particulam auræ,* [fixing to earth the etherial spark divine]. And if any

man flatter himself that he will employ his fortune well though he should obtain it ill, as was said concerning Augustus Cæsar, and after of Septimius Severus, *that either they should never have been born or else they should never have died*, they did so much mischief in the pursuit and ascent of their greatness, and so much good when they were established; yet these compensations and satisfactions are good to be used, but never good to be purposed. And lastly, it is not amiss for men in their race toward their fortune to cool themselves a little with that conceit which is elegantly expressed by the emperor Charles the fifth in his instructions to the king his son, *that fortune hath somewhat of the nature of a woman, that if she be too much wooed she is the farther off.* But this last is but a remedy for those whose tastes are corrupted: let men rather build upon that foundation which is as a corner-stone of divinity and philosophy, wherein they join close, namely that same *Primum quærite.* For divinity saith, *Primum quærite regnum Dei, et ista omnia adjicientur vobis*, [seek ye first the kingdom of God, and all these things shall be added unto you:] and philosophy saith, *Primum quærite bona animi, cætera aut aderunt aut non oberunt*, [seek ye first the good things of the mind, all other good things will either come or not be wanted]. And although the human foundation hath somewhat of the sand [1], as we see in M. Brutus when he brake forth into that speech,

Te colui, Virtus, ut rem; at tu nomen inane es;

[I took thee, Virtue, for a reality, but I find thee an empty name;] yet the divine foundation is upon the rock. But this may serve for a taste of that knowledge which I noted as deficient.

¶ [2] Concerning Government, it is a part of knowledge secret

[1] *same* in the original: *sands* in edd. 1629 and 1633.

[2] De Aug. viii. 3. The first part of this chapter is entirely altered in the translation; the remarks on the secret nature of Government, as a subject not proper for scrutiny, being omitted altogether; and the complimentary excuse for not entering upon it himself being transferred to the opening of the book. In this place indeed he speaks of it as a subject which his own long experience as an officer of state qualified him to handle, and on which he had some work in contemplation, though he thought it would be either abortive or posthumous; alluding probably to the *New Atlantis*, in which we know from Dr. Rawley that he did intend to exhibit a model of a perfect government. For the present however he confines himself to two treatises, given by way of example; one on the art of extending the bounds of Empire (which is a translation of the twenty-ninth Essay); the other on Universal Justice.

and retired, in both these respects in which things are deemed secret; for some things are secret because they are hard to know, and some because they are not fit to utter. We see all governments are obscure and invisible.

> Totamque infusa per artus
> Mens agitat molem, et magno se corpore miscet.
>
> [In every pore diffused the great mind works,
> Stirs all the mass, and thro' the huge frame lives.]

Such is the description of governments. We see the government of God over the world is hidden, insomuch as it seemeth to participate of much irregularity and confusion. The government of the Soul in moving the Body is inward and profound, and the passages thereof hardly to be reduced to demonstration. Again, the wisdom of antiquity (the shadows whereof are in the poets) in the description of torments and pains, next unto the crime of rebellion which was the Giants' offence, doth detest the offence of futility [1], as in Sisyphus and Tantalus. But this was meant of particulars: nevertheless even unto the general rules and discourses of policy and government there is due a reverent and reserved handling.

But contrariwise in the governors toward the governed all things ought, as far as the frailty of man permitteth, to be manifest and revealed. For so it is expressed in the Scriptures touching the government of God, that this globe, which seemeth to us a dark and shady body, is in the view of God as crystal: *Et in conspectu sedis tanquam mare vitreum simile crystallo*, [and before the Throne there was a sea of glass, like unto crystal]. So unto princes and states, and specially towards wise senates and councils, the natures and dispositions of the people, their conditions and necessities, their factions and combinations, their animosities and discontents, ought to be, in regard of the variety of their intelligences, the wisdom of their observations, and the height of their station where they keep sentinel, in great part clear and transparent. Wherefore, considering that I write to a king that is a master of this science, and is so well assisted, I think it decent to pass over this part in silence, as willing to obtain the certificate which one of the

[1] So edd. 1629 and 1633. The original has *facilitie*. By *futility* I understand *idle curiosity*.

ancient philosophers aspired unto; who being silent, when others contended to make demonstration of their abilities by speech, desired it might be certified for his part, *that there was one that knew how to hold his peace.*

Notwithstanding, for the more public part of government, which is Laws, I think good to note only one deficience; which is, that all those which have written of laws, have written either as philosophers or as lawyers, and none as statesmen. As for the philosophers, they make imaginary laws for imaginary commonwealths; and their discourses are as the stars, which give little light because they are so high. For the lawyers, they write according to the states where they live, what is received law, and not what ought to be law: for the wisdom of a lawmaker is one, and of a lawyer is another. For there are in nature certain fountains of justice, whence all civil laws are derived but as streams; and like as waters do take tinctures and tastes from the soils through which they run, so do civil laws vary according to the regions and governments where they are planted, though they proceed from the same fountains. Again, the wisdom of a lawmaker consisteth not only in a platform of justice, but in the application thereof; taking into consideration by what means laws may be made certain, and what are the causes and remedies of the doubtfulness and incertainty of law; by what means laws may be made apt and easy to be executed, and what are the impediments and remedies in the execution of laws; what influence laws touching private right of *meum* and *tuum* have into the public state, and how they may be made apt and agreeable; how laws are to be penned and delivered, whether in Texts or in Acts; brief or large; with preambles or without; how they are to be pruned and reformed from time to time; and what is the best means to keep them from being too vast in volumes or too full of multiplicity and crossness; how they are to be expounded, when upon causes emergent and judicially discussed, and when upon responses and conferences touching general points or questions; how they are to be pressed, rigorously or tenderly; how they are to be mitigated by equity and good conscience; and whether discretion and strict law are to be mingled in the same courts or kept apart in several courts; again, how the practice, profession, and erudition of law is to be censured and governed; and many other points touching the administration,

De prudentia legislatoria, sive de fontibus Juris.

and (as I may term it) animation of laws. Upon which I insist the less, because I purpose (if God give me leave), having begun a work of this nature in aphorisms [1], to propound it hereafter noting it in the mean time for deficient.

And for your Majesty's laws of England, I could say much of their dignity, and somewhat of their defect; but they cannot but excel the civil laws in fitness for the government: for the civil law was *non hos quæsitum munus in usus;* it was not made for the countries which it governeth. Hereof I cease to speak, because I will not intermingle matter of action with matter of general learning.[2]

THUS have I concluded this portion of learning touching Civil Knowledge; and with civil knowledge have concluded Human Philosophy; and with human philosophy, Philosophy in General. And being now at some pause, looking back into that I have passed through, this writing seemeth to me, (*si nunquam fallit imago*) as far as a man can judge of his own work, not much better than that noise or sound which musicians make while they are tuning their instruments; which is nothing pleasant to hear, but yet is a cause why the music is sweeter afterwards. So have I been content to tune the instruments of the muses, that they may play that have better hands. And surely, when I set before me the condition of these times, in which learning hath made her third visitation or circuit, in all the qualities thereof; as the excellency and vivacity of the wits of this age; the noble helps and lights which we have by the travails of ancient writers; the art of printing, which communicateth books to men of all fortunes; the openness of the world by navigation, which hath disclosed multitudes of experiments, and a mass of natural history; the leisure wherewith these times abound, not employing men so generally in civil business, as the states of Græcia did in respect of their popularity, and the state of Rome in respect of the greatness of

[1] This was no doubt the treatise which is given by way of specimen in the *De Augmentis*. The perfection of a law is there described as consisting in five things: it must be certain in its meaning; just in its rules; convenient in execution; agreeable to the form of government; and productive of virtue in the governed. Of these heads the first only is discussed; but under it almost all the points enumerated in the text come under consideration, more or less completely.

[2] This paragraph is omitted in the translation.

their monarchy; the present disposition of these times at this instant to peace[1]; the consumption of all that ever can be said in controversies of religion, which have so much diverted men from other sciences; the perfection of your Majesty's learning, which as a phœnix may call whole vollies of wits to follow you; and the inseparable propriety of time, which is ever more and more to disclose truth; I cannot but be raised to this persuasion, that this third period of time will far surpass that of the Græcian and Roman learning: only if men will know their own strength and their own weakness both; and take one from the other light of invention, and not fire of contradiction; and esteem of the inquisition of truth as of an enterprise, and not as of a quality or ornament; and employ wit and magnificence to things of worth and excellency, and not to things vulgar and of popular estimation. As for my labours, if any man shall please himself or others in the reprehension of them, they shall make that ancient and patient request, *Verbera sed audi*, [strike me if you will, only hear me;] let men reprehend them, so they observe and weigh them. For the appeal is (lawful though it may be it shall not be needful) from the first cogitations of men to their second, and from the nearer times to the times further off. Now let us come to that learning, which both the former times were not so blessed as to know, sacred and inspired Divinity, the Sabaoth and port of all men's labours and peregrinations.

¶ [2] THE prerogative of God extendeth as well to the reason as to the will of man; so that as we are to obey his law though we find a reluctation in our will, so we are to believe his word

[1] This was written just after the conclusion of peace between England and Spain; when the translation was published the *disposition* of the times was less peaceable, but a greater part of Europe was actually at peace; and accordingly instead of the expression in the text he substitutes, "the peace which is at this time enjoyed by Britain, Spain, Italy, France too at last, and other regions not a few."

[2] De Aug. ix. 1. This chapter is greatly altered in the translation; much of it being entirely omitted, much condensed, and a little added. In the exordium he announces the subject of the book as one which does not belong to human reason and natural philosophy. He will not therefore attempt to lay out the "partitions" of it, but merely offer a few suggestions, concerning not the matter revealed by Theology, but the manner of the revelation. These suggestions, which are but three in number, together with the remarks by which they are introduced, agree substantially with those in the text: all that does not bear immediately upon them being omitted. And I think all the differences may be sufficiently accounted for by the change of design; while the change of design itself may probably have been suggested by the difficulty of expounding the subject of theology on a scale similar to that adopted with regard to other subjects, without introducing matter which might have caused the work to be proscribed in Italy. See note, p. 277.

though we find a reluctation in our reason. For if we believe only that which is agreeable to our sense, we give consent to the matter and not to the author; which is no more than we would do towards a suspected and discredited witness; but that faith which was accounted to Abraham for righteousness was of such a point as whereat Sarah laughed, who therein was an image of natural reason.

Howbeit (if we will truly consider it) more worthy it is to believe than to know as we now know. For in knowledge man's mind suffereth from sense, but in belief it suffereth from spirit, such one as it holdeth for more authorised than itself[1], and so suffereth from the worthier agent. Otherwise it is of the state of man glorified; for then faith shall cease, and we shall know as we are known.

Wherefore we conclude that sacred Theology (which in our idiom we call Divinity) is grounded only upon the word and oracle of God, and not upon the light of nature: for it is written, *Cœli enarrant gloriam Dei,* [the Heavens declare the glory of God,] but it is not written, *Cœli enarrant voluntatem Dei,* [the Heavens declare the will of God,] but of that it is said, *Ad legem et testimonium: si non fecerint secundum verbum istud,* &c., [to the law and to the testimony: if they do not according to this word, &c.]. This holdeth not only in those points of faith which concern the great mysteries of the Deity, of the Creation, of the Redemption, but likewise those which concern the law moral truly interpreted: *Love your enemies: do good to them that hate you: be like to your heavenly Father, that suffereth his rain to fall upon the just and unjust.* To this it ought to be applauded, *Nec vox hominem sonat:* it is a voice beyond the light of nature. So we see the heathen poets, when they fall upon a libertine passion, do still expostulate with laws and moralities, as if they were opposite and malignant to nature: *Et quod natura remittit, invida jura negant,* [what Nature suffers envious laws forbid]. So said Dendamis the Indian unto Alexander's messengers, That he had heard somewhat of Pythagoras and some other of the wise men of Græcia, and that he held them for excellent men: but

[1] In the translation this is expressed rather differently. *In scientia enim* mens humana *patitur a sensu, qui a rebus materiatis resilit; in fide autem* anima *patitur ab anima, quæ est agens dignius:* Knowledge being (if I understand the meaning rightly) a function of the *anima sensibilis,* faith of the *anima rationalis;* the one receiving its impressions from things material, the other from things spiritual.

that they had a fault, which was that they had in too great reverence and veneration a thing they called law and manners. So it must be confessed that a great part of the law moral is of that perfection, whereunto the light of nature cannot aspire. How then is it that man is said to have by the light and law of nature some notions and conceits of virtue and vice, justice and wrong, good and evil? Thus; because the light of nature is used in two several senses; the one, that which springeth from reason, sense, induction, argument, according to the laws of heaven and earth; the other, that which is imprinted upon the spirit of man by an inward instinct, according to the law of conscience, which is a sparkle of the purity of his first estate: in which later sense only he is participant of some light and discerning touching the perfection of the moral law: but how? sufficient to check the vice, but not to inform the duty. So then the doctrine of religion, as well moral as mystical, is not to be attained but by inspiration and revelation from God.

The use notwithstanding of reason in spiritual things, and the latitude thereof, is very great and general: for it is not for nothing that the apostle calleth religion *our reasonable service of God;* insomuch as the very ceremonies and figures of the old law were full of reason and signification, much more than the ceremonies of idolatry and magic, that are full of non-significants and surd characters. But most specially the Christian Faith, as in all things so in this, deserveth to be highly magnified; holding and preserving the golden mediocrity in this point between the law of the Heathen and the law of Mahumet, which have embraced the two extremes. For the religion of the Heathen had no constant belief or confession, but left all to the liberty of argument; and the religion of Mahumet on the other side interdicteth argument altogether: the one having the very face of error, and the other of imposture: whereas the Faith doth both admit and reject disputation with difference.

The use of human reason in religion is of two sorts: the former, in the conception and apprehension of the mysteries of God to us revealed; the other, in the inferring and deriving of doctrine and direction thereupon. The former extendeth to the mysteries themselves; but how? by way of illustration, and not by way of argument. The later consisteth indeed of probation and argument. In the former we see God vouch-

safeth to descend to our capacity, in the expressing of his mysteries in sort as may be sensible unto us; and doth grift[1] his revelations and holy doctrine upon the notions of our reason, and applieth his inspirations to open our understanding, as the form of the key to the ward of the lock[2]: for the later, there is allowed us an use of reason and argument secondary and respective, although not original and absolute. For after the articles and principles of religion are placed, and exempted from examination of reason, it is then permitted unto us to make derivations and inferences from and according to the analogy of them, for our better direction. In nature this holdeth not; for both the principles are examinable by induction, though not by a medium or syllogism; and besides, those principles or first positions have no discordance with that reason which draweth down and deduceth the inferior positions. But yet it holdeth not in religion alone, but in many knowledges both of greater and smaller nature, namely wherein there are not only *posita* but *placita;* for in such there can be no use of absolute reason. We see it familiarly in games of wit, as chess, or the like; the draughts and first laws of the game are positive, but how? merely *ad placitum,* and not examinable by reason; but then how to direct our play thereupon with best advantage to win the game, is artificial and rational. So in human laws there be many grounds and maxims which are *placita juris,* positive upon authority and not upon reason, and therefore not to be disputed: but what is most just, not absolutely, but relatively and according to those maxims, that affordeth a long field of disputation. Such therefore is that secondary reason which hath place in divinity, which is grounded upon the *placets* of God.

De usu legitimo rationis humanæ in divinis.

Here therefore I note this deficience, that there hath not been to my understanding sufficiently enquired and handled *the true limits and use of reason in spiritual things,* as a kind of divine dialectic: which for that it is not done, it seemeth to me a thing usual, by pretext of

[1] So the original and ed. 1629. Ed. 1633 has *graft.*

[2] It being our own duty at the same time to open and enlarge our understanding that it may be capable of receiving them. *Qua tamen in parte nobis ipsis deesse minime debemus; cum enim Deus ipse opera rationis nostræ in illuminationibus suis utatur, etiam nos eandem in omnes partes versare debemus quo magis capaces simus ad mysteria recipienda et imbibenda: modo animus ad amplitudinem mysteriorum pro modulo suo dilatetur, non mysteria ad angustias animi constringantur.*

true conceiving that which is revealed, to search and mine into that which is not revealed; and by pretext of enucleating inferences and contradictories, to examine that which is positive; the one sort falling into the error of Nicodemus, demanding to have things made more sensible than it pleaseth God to reveal them; *Quomodo possit homo nasci cum sit senex?* [how can a man be born when he is old?] the other sort into the error of the disciples, which were scandalized at a show of contradiction; *Quid est hoc quod dicit nobis? Modicum, et non videbitis me; et iterum, modicum, et videbitis me,* &c. [what is this that he saith unto us? a little while and ye shall not see me, and again a little while and ye shall see me, &c.]

Upon this I have insisted the more in regard of the great and blessed use thereof; for this point well laboured and defined of would in my judgment be an opiate to stay and bridle not only the vanity of curious speculations, wherewith the schools labour, but the fury of controversies, wherewith the church laboureth. For it cannot but open men's eyes, to see that many controversies do merely pertain to that which is either not revealed or positive; and that many others do grow upon weak and obscure inferences or derivations: which latter sort, if[1] men would revive the blessed style of that great doctor of the Gentiles, would be carried thus, *Ego, non Dominus,* [I, not the Lord,] and again, *Secundum consilium meum,* [according to my counsel;] in opinions and counsels, and not in positions and oppositions. But men are now over-ready to usurp the style *Non ego, sed Dominus,* [not I, but the Lord;] and not so only, but to bind it with the thunder and denunciation of curses and anathemas, to the terror of those which have not sufficiently learned out of Salomon that *the causeless curse shall not come.*[2]

Divinity hath two principal parts; the matter informed or revealed, and the nature of the information or revelation: and with the later we will begin[3], because it hath most coherence with that which we have now last handled. The nature of the information consisteth of three branches; the limits of the information, the sufficiency of the information, and the acquiring

[1] The original and also edd. 1629 and 1633 have *of.*

[2] In the translation this last sentence is omitted, and the substance both of this and of the preceding paragraph is set forth in a better order and more concisely, though to the same general effect.

[3] In the translation he expressly confines himself to the latter only, and the rest of the paragraph is omitted.

or obtaining the information. Unto the limits of the information belong these considerations; how far forth particular persons continue to be inspired; how far forth the church is inspired; and how far forth reason may be used: the last point whereof I have noted as deficient. Unto the sufficiency of the information belong two considerations; what points of religion are fundamental, and what perfective, being matter of further building and perfection upon one and the same foundation; and again, how the gradations of light according to the dispensation of times are material to the sufficiency of belief.

De gradibus unitatis in Civitate Dei.

Here again I may rather give it in advice than note it as deficient, that the points fundamental, and the points of further perfection only, ought to be with piety and wisdom distinguished: a subject tending to much like end as that I noted before; for as that other were likely to abate the number of controversies, so this is like to abate the heat of many of them. We see Moses when he saw the Israelite and the Ægyptian fight, he did not say, *Why strive you?* but drew his sword and slew the Ægyptian: but when he saw the two Israelites fight, he said, *You are brethren, why strive you?* If the point of doctrine be an Ægyptian, it must be slain by the sword of the Spirit, and not reconciled; but if it be an Israelite, though in the wrong, then, *Why strive you?* We see of the fundamental points, our Saviour penneth the league thus, *He that is not with us, is against us;* but of points not fundamental, thus, *He that is not against us, is with us.* So we see the coat of our Saviour was entire without seam, and so is the doctrine of the Scriptures in itself; but the garment of the Church was of divers colours, and yet not divided. We see the chaff may and ought to be severed from the corn in the ear, but the tares may not be pulled up from the corn in the field: so as it is a thing of great use well to define what and of what latitude those points are, which do make men merely aliens and disincorporate from the Church of God.[1]

[1] Of this paragraph again the substance is given in the translation, though in a somewhat different order; and a sentence is added to the following effect: If any one thinks (he says) that this has been done already, let him consider again and again how far it has been done with sincerity and moderation. In the mean time he who speaks of peace is like enough to receive the answer which Jehu gave to the messenger — *Is it peace, Jehu? What hast thou to do with peace? Get thee behind me.* For it is not peace between the contending opinions that most men have at heart, but the establishment of their own opinions (*cum non pax, sed partes, plerisque cordi sint*).

For the obtaining of the information, it resteth upon the true and sound interpretation of the Scriptures, which are the fountains of the water of life. The interpretations of the Scriptures[1] are of two sorts; methodical, and solute or at large. For this divine water, which excelleth so much that of Jacob's well, is drawn forth much in the same kind as natural water useth to be out of wells and fountains; either it is first forced up into a cistern, and from thence fetched and derived for use; or else it is drawn and received in buckets and vessels immediately where it springeth. The former sort whereof, though it seem to be the more ready, yet in my judgment is more subject to corrupt.[2] This is that method which hath exhibited unto us the scholastical divinity; whereby divinity hath been reduced into an art, as into a cistern, and the streams of doctrine or positions fetched and derived from thence.

In this men have sought three things, a summary brevity, a compacted strength, and a complete perfection; whereof the two first they fail to find, and the last they ought not to seek. For as to brevity, we see in all summary methods, while men purpose to abridge they give cause to dilate. For the sum or abridgment by contraction becometh obscure, the obscurity requireth exposition, and the exposition is deduced into large commentaries, or into common places and titles, which grow to be more vast than the original writings whence the sum was at first extracted. So we see the volumes of the schoolmen are greater much than the first writings of the fathers, whence the Master of the Sentences[3] made his sum or collection. So in like manner the volumes of the modern doctors of the civil law exceed those of the ancient jurisconsults, of which Tribonian compiled the digest.[4] So as this course of sums and commen-

[1] A sentence is introduced here in the translation, to say that he speaks only of the *method* of interpretation, not of the authority: the ground of the authority being the consent of the Church.

[2] This censure, as well as the remarks upon the methodical system which are contained in the three following paragraphs, are omitted in the translation; probably as involving matter which would not have been allowed at Rome.

[3] Peter the Lombard, Bishop of Paris, wrote a Sum of Theology in four books, entitled "The Sentences;" and according to the taste of the middle ages acquired the title of "Master of the Sentences." Many of these scholastic titles are curious. Thus Thomas Aquinas is Doctor Angelicus; Buonaventura, Doctor Seraphicus; Alexander Hales, Doctor Irrefragabilis; Duns Scotus, Doctor Subtilis; Raymund Lully, Doctor Illuminatus; Roger Bacon, Doctor Mirabilis; Occam, Doctor Singularis. — *R. L. E.*

[4] Compare with this remark that of Maphæus Vegius — "Existimabas, ut opinor," — he is apostrophising Tribonian — "plurimum conducere utilitati studentium, si quod antea in multitudine tractatuum tardius effecerunt coangustatis postea libris citius adsequi possunt. . . . Sed longe secus ác persuadebas tibi cessit. Quis namque

taries is that which doth infallibly make the body of sciences more immense in quantity, and more base in substance.

And for strength, it is true that knowledges reduced into exact methods have a shew of strength, in that each part seemeth to support and sustain the other; but this is more satisfactory than substantial; like unto buildings which stand by architecture and compaction, which are more subject to ruin than those which are built more strong in their several parts, though less compacted. But it is plain that the more you recede from your grounds the weaker do you conclude; and as in nature the more you remove yourself from particulars the greater peril of error you do incur, so much more in divinity the more you recede from the Scriptures by inferences and consequences, the more weak and dilute are your positions.

And as for perfection or completeness in divinity, it is not to be sought; which makes this course of artificial divinity the more suspect. For he that will reduce a knowledge into an art, will make it round and uniform: but in divinity many things must be left abrupt and concluded with this: *O altitudo sapientiæ et scientiæ Dei! quam incomprehensibilia sunt judicia ejus, et non investigabiles viæ ejus!* [O the depth of the wisdom and knowledge of God! How incomprehensible are his judgments, and his ways past finding out!] So again the apostle saith, *Ex parte scimus,* [we know in part,] and to have the form of a total where there is but matter for a part, cannot be without supplies by supposition and presumption. And therefore I conclude, that the true use of these Sums and Methods hath place in institutions or introductions preparatory unto knowledge; but in them, or by deducement from them, to handle the main body and substance of a knowledge, is in all sciences prejudicial, and in divinity dangerous.

As to the interpretation of the Scriptures solute and at large, there have been divers kinds introduced and devised; some of them rather curious and unsafe, than sober and warranted. Notwithstanding thus much must be confessed, that the Scriptures, being given by inspiration and not by human reason, do differ from all other books in the author; which by consequence doth draw on some difference to be

nesciat infinitas et nonnunquam ineptas vanasque interpretationes quibus nulla fere lex exempta est?" See Maphæus Vegius de Verborum significatione, xiv. 77., apud Savigny; History of Roman Law in the Middle Ages, ch. 59. — *R. L. E.*

used by the expositor. For the inditer of them did know four things which no man attains to know; which are, the mysteries of the kingdom of glory; the perfection of the laws of nature; the secrets of the heart of man; and the future succession of all ages.[1] For as to the first, it is said, *He that presseth into the light, shall be oppressed of the glory:* and again, *No man shall see my face and live.* To the second, *When he prepared the heavens I was present, when by law and compass he inclosed the deep.* To the third, *Neither was it needful that any should bear witness to him of Man, for he knew well what was in Man.* And to the last, *From the beginning are known to the Lord all his works.*

From the former two[2] of these have been drawn certain senses and expositions of Scriptures, which had need be contained within the bounds of sobriety; the one anagogical, and the other philosophical. But as to the former, man is not to prevent his time: *Videmus nunc per speculum in ænigmate, tunc autem facie ad faciem:* [now we see through a glass darkly, but then face to face:] wherein nevertheless there seemeth to be a liberty granted, as far forth as the polishing of this glass, or some moderate explication of this ænigma. But to press too far into it, cannot but cause a dissolution and overthrow of the spirit of man. For in the body there are three degrees of that we receive into it; Aliment, Medicine, and Poison; whereof aliment is that which the nature of man can perfectly alter and overcome: medicine is that which is partly converted by nature, and partly converteth nature; and poison is that which worketh wholly upon nature, without that that nature can in any part work upon it. So in the mind whatsoever knowledge reason cannot at all work upon and convert, is a mere intoxication, and endangereth a dissolution of the mind and understanding.

But for the latter[3], it hath been extremely set on foot of

[1] Of these four things he mentions in the translation only the two last; introducing the mention of them in the next paragraph but three, and in the mean time omitting altogether both this and the following paragraph.

[2] *i. e.* from the intimations in the Scriptures concerning the Kingdom of Glory and the Laws of Nature. Edd. 1629 and 1633 have "from the former of these two;" obviously a misprint, though adopted in all modern editions.

[3] *i. e.* the *philosophical* exposition. The "*former*," *i. e.* the *anagogical* exposition, is not mentioned in the translation; which only says that the method of interpretation solute and at large has been carried to excess in two ways; first in supposing such perfection in the Scriptures that all philosophy is to be sought there, secondly in interpreting them in the same manner as one would interpret an uninspired book. The

late time by the school of Paracelsus, and some others, that have pretended to find the truth of all natural philosophy in the Scriptures; scandalizing and traducing all other philosophy as heathenish and profane. But there is no such enmity between God's word and his works. Neither do they give honour to the Scriptures, as they suppose, but much imbase them. For to seek heaven and earth in the word of God, whereof it is said, *Heaven and earth shall pass, but my word shall not pass*, is to seek temporary things amongst eternal: and as to seek divinity in philosophy is to seek the living amongst the dead, so to seek philosophy in divinity is to seek the dead amongst the living[1]: neither are the pots or lavers whose place was in the outward part of the temple to be sought in the holiest place of all, where the ark of the testimony was seated. And again, the scope or purpose of the Spirit of God is not to express matters of nature in the Scriptures, otherwise than in passage, and for application to man's capacity and to matters moral or divine. And it is a true rule, *Authoris aliud agentis parva authoritas;* [what a man says incidentally about matters which are not in question has little authority;] for it were a strange conclusion, if a man should use a similitude for ornament or illustration sake, borrowed from nature or history according to vulgar conceit, as of a Basilisk, an Unicorn, a Centaur, a Briareus, an Hydra, or the like, that therefore he must needs be thought to affirm the matter thereof positively to be true. To conclude therefore, these two interpretations, the one by reduction or ænigmatical, the other philosophical or physical, which have been received and pursued in imitation of the rabbins and cabalists, are to be confined with a *Noli altum sapere, sed time*, [be not overwise, but fear.]

But the two later points, known to God and unknown to man, touching *the secrets of the heart, and the successions of time*, doth make a just and sound difference between the manner of the exposition of the Scriptures, and all other books. For it is an excellent observation which hath been made upon the answers of our Saviour Christ to many of the questions which were propounded to him, how that they are impertinent to the

remarks on the first of these excesses coincide with the first half of this paragraph (the rest being omitted), those on the second with the next paragraph.

[1] The rest of this paragraph is omitted in the translation.

state of the question demanded; the reason whereof is, because not being like man, which knows man's thoughts by his words, but knowing man's thoughts immediately, he never answered their words, but their thoughts [1]: much in the like manner it is with the Scriptures, which being written to the thoughts of men, and to the succession of all ages, with a foresight of all heresies, contradictions, differing estates of the church, yea and particularly of the elect, are not to be interpreted only according to the latitude of the proper sense of the place, and respectively towards that present occasion whereupon the words were uttered; or in precise congruity or contexture with the words before or after; or in contemplation of the principal scope of the place; but have in themselves, not only totally or collectively, but distributively in clauses and words, infinite springs and streams of doctrine to water the church in every part [2]; and therefore as the literal sense is as it were the main stream or river; so the moral sense chiefly, and sometimes the allegorical or typical, are they whereof the church hath most use: not that I wish men to be bold in allegories, or indulgent or light in allusions; but that I do much condemn that interpretation of the Scripture which is only after the manner as men use to interpret a profane book.

In this part touching the exposition of the Scriptures, I can report no deficience; but by way of remembrance this I will add: In perusing books of divinity, I find many [3] books of controversies; and many of common places and treatises [4]; a mass of positive divinity, as it is made an art; a number of sermons and lectures, and many prolix commentaries upon the Scriptures, with harmonies and concordances: but that form of writing in divinity, which in my judgment is of all others most rich and precious, is positive divinity collected upon particular texts of Scriptures in brief observations; not dilated into common places, not chasing after controversies, not reduced into method of art; a thing abounding in sermons, which will vanish, but defective in books, which will remain; and a thing wherein this age excelleth. For I am persuaded, and

[1] And also (the translation adds) because he addressed himself not solely to those present, but to men of all times and places to whom the gospel was to be preached.

[2] The rest of the paragraph is omitted in the translation.

[3] In the translation he says *too many*.

[4] also "cases of conscience" — which he especially commends further on, in a passage not translated.

I may speak it with an *Absit invidia verbo,* [meaning no offence,] and no ways in derogation of antiquity, but as in a good emulation between the vine and the olive, that if the choice and best of those observations upon texts of Scriptures which have been made dispersedly in sermons within this your Majesty's island[1] of Britain by the space of these forty years and more (leaving out the largeness of exhortations and applications thereupon) had been set down in a continuance, it had been the best work in divinity which had been written since the apostles' times.[2]

Emanationes Scripturarum in doctrinas positivas.

The matter informed by divinity is of two kinds; matter of belief and truth of opinion, and matter of service and adoration; which is also judged and directed by the former; the one being as the internal soul of religion, and the other as the external body thereof. And therefore the heathen religion was not only a worship of idols, but the whole religion was an idol in itself; for it had no soul, that is, no certainty of belief or confession; as a man may well think, considering the chief doctors of their church were the poets; and the reason was, because the heathen gods were no jealous gods, but were glad to be admitted into part, as they had reason. Neither did they respect the pureness of heart, so they might have external honour and rites.

But out of these two do result and issue four main branches of divinity; Faith, Manners, Liturgy, and Government. Faith containeth the doctrine of the nature of God, of the attributes of God, and of the works of God. The nature of God consisteth of three persons in unity of Godhead. The attributes of God are either common to the Deity, or respective to the persons. The works of God summary are two, that of the Creation, and that of the Redemption; and both these works, as in total they appertain to the unity of the Godhead, so in their parts they refer to the three persons: that of the Creation, in the mass of the matter to the Father; in the disposition of the form to the

[1] So edd. 1629 and 1633. The original has *ilands.*

[2] This last sentence is omitted in the translation, — no doubt as being inadmissible at Rome. But in its place is introduced one of Bacon's happiest illustrations, and one which is not, I think, to be found anywhere in his own English. "Certainly (he says) as we find it in wines, that those which flow freely from the first treading of the grape are sweeter than those which are squeezed out by the wine-press, because the latter taste somewhat of the stone and the rind; so are those doctrines most wholesome and sweet which ooze out of the Scriptures when gently crushed, and are not forced into controversies and common places."

The next six paragraphs are entirely omitted, — as belonging to that part of the subject with which he has professed in the beginning that he will not meddle.

Son; and in the continuance and conservation of the being to the Holy Spirit: so that of the Redemption, in the election and counsel to the Father; in the whole act and consummation to the Son; and in the application to the Holy Spirit; for by the Holy Ghost was Christ conceived in flesh, and by the Holy Ghost are the elect regenerate in spirit. This work likewise we consider either effectually in the elect; or privatively [1] in the reprobate; or according to appearance in the visible church.

For Manners, the doctrine thereof is contained in the law, which discloseth sin. The law itself is divided, according to the edition thereof, into the law of Nature, the law Moral, and the law Positive; and according to the style, into Negative and Affirmative, Prohibitions and Commandments. Sin, in the matter and subject thereof, is divided according to the commandments; in the form thereof, it referreth to the three persons in Deity: sins of Infirmity against the Father, whose more special attribute is Power; sins of Ignorance against the Son, whose attribute is Wisdom; and sins of Malice against the Holy Ghost, whose attribute is Grace or Love. In the motions of it, it either moveth to the right hand or to the left; either to blind devotion, or to profane and libertine transgression; either in imposing restraint where God granteth liberty, or in taking liberty where God imposeth restraint. In the degrees and progress of it, it divideth itself into thought, word, or act. And in this part I commend much the deducing of the law of God to cases of conscience; for that I take indeed to be a breaking, and not exhibiting whole, of the bread of life. But that which quickeneth both these doctrines of faith and manners, is the elevation and consent of the heart; whereunto appertain books of exhortation, holy meditation, Christian resolution, and the like.

For the Liturgy or service, it consisteth of the reciprocal acts between God and man; which, on the part of God, are the preaching of the word and the sacraments, which are seals to the covenant, or as the visible word; and on the part of man [2], invocation of the name of God, and under the law, sacrifices, which were as visible prayers or confessions: but now the adoration being *in spiritu et veritate,* [in spirit and in truth,] there remaineth only *vituli labiorum,* [offerings of the lips;]

[1] The original, and also edd. 1629 and 1633, have *privately.*
[2] So edd. 1629 and 1633. The original has *mans.*

although the use of holy vows of thankfulness and retribution may be accounted also as sealed petitions.

And for the Government of the church, it consisteth of the patrimony of the church, the franchises of the church, and the offices and jurisdictions of the church, and the laws of the church directing the whole; all which have two considerations, the one in themselves, the other how they stand compatible and agreeable to the civil estate.

This matter of divinity is handled either in form of instruction of truth, or in form of confutation of falsehood. The declinations from religion, besides the privative[1], which is atheism and the branches thereof, are three; Heresies, Idolatry, and Witchcraft; Heresies, when we serve the true God with a false worship; Idolatry, when we worship false gods, supposing them to be true; and Witchcraft, when we adore false gods, knowing them to be wicked and false. For so your Majesty doth excellently well observe, that Witchcraft is the height of Idolatry. And yet we see though these be true degrees, Samuel teacheth us that they are all of a nature, when there is once a receding from the word of God; for so he saith, *Quasi peccatum ariolandi est repugnare, et quasi scelus idololatriæ nolle acquiescere;* [rebellion is as the sin of Witchcraft, and Stubbornness as the crime of Idolatry].

These things I have passed over so briefly because I can report no deficience concerning them: for I can find no space or ground that lieth vacant and unsown in the matter of divinity; so diligent have men been, either in sowing of good seed or in sowing of tares.

Thus have I made as it were a small Globe of the Intellectual World, as truly and faithfully as I could discover; with a note and description of those parts which seem to me not constantly occupate, or not well converted by the labour of man. In which, if I have in any point receded from that which is commonly received, it hath been with a purpose of proceeding *in melius*, and not *in aliud;* a mind of amendment and proficience, and not of change and difference. For I could not be true and constant to the argument I handle, if I were not willing to go beyond others; but yet not more willing than to have others go beyond me again: which may the better appear

[1] So edd. 1629 and 1633. The original has *primitive*.

by this, that I have propounded my opinions naked and unarmed, not seeking to preoccupate the liberty of men's judgments by confutations. For in any thing which is well set down, I am in good hope that if the first reading move an objection, the second reading will make an answer. And in those things wherein I have erred, I am sure I have not prejudiced the right by litigious arguments; which certainly have this contrary effect and operation, that they add authority to error, and destroy the authority of that which is well invented: for question is an honour and preferment to falsehood, as on the other side it is a repulse to truth. But the errors I claim and challenge to myself as mine own. The good, if any be, is due *tanquam adeps sacrificii*, [as the fat of the sacrifice,] to be incensed to the honour, first of the Divine Majesty, and next of your Majesty, to whom on earth I am most bounden.

FILUM LABYRINTHI,

SIVE

FORMULA INQUISITIONIS.

PREFACE.

THE following fragment was first printed in Stephens's second collection (1734), from a manuscript belonging to Lord Oxford, which is now in the British Museum (Harl. MSS. 6797. fo. 139.) As far as it goes, it agrees so nearly with the *Cogitata et Visa* that either might be taken for a free translation of the other, with a few additions and omissions. But I think the English was written first; probably at the time when the idea first occurred to Bacon of drawing attention to his doctrine by exhibiting a specimen of the process and the result in one or two particular cases. The *Cogitata et Visa* professes to be merely a preface framed to prepare the way for an example of a legitimate philosophical investigation proceeding regularly by Tables. Such an example, or at least the plan and skeleton of it, will be found further on, with the title *Filum Labyrinthi, sive Inquisitio legitima de Motu;* and the title prefixed to this fragment is most easily explained by supposing that a specimen of an *Inquisitio legitima* was meant to be included in it.

It is here printed from the original MS. which is a fair copy in the hand of one of Bacon's servants, carefully corrected in his own.

J. S.

FILUM LABYRINTHI,

SIVE FORMULA INQUISITIONIS.

AD FILIOS.[1]

PARS PRIMA.

1. Francis Bacon thought in this manner. The knowledge whereof the world is now possessed, especially that of nature, extendeth not to magnitude and certainty of works. The Physician pronounceth many diseases incurable, and faileth oft in the rest. The Alchemists wax old and die in hopes. The Magicians perform nothing that is permanent and profitable. The Mechanics take small light from natural philosophy, and do but spin on their own little threads. Chance sometimes discovereth inventions; but that worketh not in years, but ages. So he saw well, that the inventions known are very unperfect; and that new are not like to be brought to light but in great length of time; and that those which are, came not to light by philosophy.

2. He thought also this state of knowledge was the worse, because men strive (against themselves) to save the credit of ignorance, and to satisfy themselves in this poverty. For the Physician, besides his cauteles of practice, hath this general cautele of art, that he dischargeth the weakness of his art upon supposed impossibilities: neither can his art be condemned, when itself judgeth. That philosophy also, out of which the knowledge of physic, which now is in use, is hewed, receiveth certain positions and opinions, which (if they be well weighed) induce this persuasion, that no great works are to be expected from art, and the hand of man; as in particular that opinion, *that the heat of the sun and fire differ in kind;* and that other, *that Composition is the work of man, and Mixture is the work of*

[1] This is written at the top of the page, in the left-hand corner, in Bacon's hand.

nature, and the like; all tending to the circumscription of man's power, and to artificial despair; killing in men, not only the comfort of[1] imagination, but the industry of trial; only upon vain glory to have their art thought perfect, and that all is impossible that is not already found. The Alchemist dischargeth his art upon his own errors, either supposing a misunderstanding of the words of his authors, which maketh him listen after auricular traditions; or else a failing in the true proportions and scruples of practice, which maketh him renew infinitely his trials; and finding also that he lighteth upon some mean experiments and conclusions by the way, feedeth upon them, and magnifieth them to the most, and supplieth the rest in hopes. The Magician, when he findeth something (as he conceiveth) above nature effected, thinketh, when a breach is once made in nature, that it is all one to perform great things and small; not seeing that they are but subjects of a certain kind, wherein magic and superstition hath played in all times. The Mechanical person, if he can refine an invention, or put two or three observations or practices together in one, or couple things better with their use, or make the work in less or greater volume, taketh himself for an inventor. So he saw well, that men either persuade themselves of new inventions as of impossibilities; or else think they are already extant, but in secret and in few hands; or that they account of those little industries and additions, as of inventions: all which turneth to the averting of their minds from any just and constant labour to invent further in any quantity.

3. He thought also, when men did set before themselves the variety and perfection of works produced by mechanical arts, they are apt rather to admire the provisions of man, than to apprehend his wants; not considering, that the original inventions and conclusions of nature which are the life of all that variety, are not many nor deeply fetched; and that the rest is but the subtile and ruled motion of the instrument and hand; and that the shop therein is not unlike the library, which in such number of books containeth (for the far greater part) nothing but iterations, varied sometimes in form, but not new in substance. So he saw plainly, that opinion of store was a cause of want; and that both works and doctrines appear many and are few.

[1] *of* is omitted in the MS.

4. He thought also, that knowledge is uttered to men, in a form as if every thing were finished; for it is reduced into arts and methods, which in their divisions do seem to include all that may be. And how weakly soever the parts are filled, yet they carry the shew and reason of a total; and thereby the writings of some received authors go for the very art: whereas antiquity used to deliver the knowledge which the mind of man had gathered, in observations, aphorisms, or short and dispersed sentences, or small tractates of some parts that they had diligently meditated and laboured; which did invite men, both to ponder that which was invented, and to add and supply further. But now sciences are delivered to be believed and accepted, and not to be examined and further discovered; and the succession is between master and disciple, and not between inventor and continuer or advancer: and therefore sciences stand at a stay, and have done for many ages, and that which is positive is fixed, and that which is question is kept question, so as the columns of no further proceeding are pitched. And therefore he saw plainly, men had cut themselves off from further invention; and that it is no marvel that that is not obtained, which hath not been attempted, but rather shut out and debarred.

5. He thought also, that knowledge is almost generally sought either for delight and satisfaction, or for gain and profession, or for credit and ornament, and that every of these are as Atalanta's balls, which hinder the race of invention. For men are so far in these courses from seeking to increase the mass of knowledge, as of that mass which is they will take no more than will serve their turn: and if any one amongst so many seeketh knowledge for itself, yet he rather seeketh to know the variety of things, than to discern of the truth and causes of them; and if his inquisition be yet more severe, yet it tendeth rather to judgment than to invention; and rather to discover truth in controversy, than new matter; and if his heart be so large as he propoundeth to himself further discovery or invention, yet it is rather of new discourse and speculation of causes, than of effects and operations: and as for those that have so much in their mouths, action and use and practice and the referring of sciences thereunto, they mean it of application of that which is known, and not of a discovery of that which is unknown. So he saw plainly, that this mark,

namely invention of further means to endow the condition and life of man with new powers or works, was almost never yet set up and resolved in man's intention and inquiry.

6. He thought also, that, amongst other knowledges, natural philosophy hath been the least followed and laboured. For since the Christian faith, the greatest number of wits have been employed, and the greatest helps and rewards have been converted upon divinity. And before time likewise, the greatest part of the studies of philosophers was consumed in moral philosophy, which was as the heathen divinity. And in both times a great part of the best wits betook themselves to law, pleadings, and causes of estate; specially in the time of the greatness of the Romans, who by reason of their large empire needed the service of all their able men for civil business. And the time amongst the Grecians in which natural philosophy seemed most to flourish, was but a short space; and that also rather abused in differing sects and conflicts of opinions, than profitably spent: since which time, natural philosophy was never any profession, nor never possessed any whole man, except perchance some monk in a cloister, or some gentleman in the country, and that very rarely; but became a science of passage, to season a little young and unripe wits, and to serve for an introduction to other arts, specially physic and the practical mathematics. So as he saw plainly, that natural philosophy hath been intended by few persons, and in them hath occupied the least part of their time, and that in the weakest of their age and judgment.

7. He thought also, how great opposition and prejudice natural philosophy had received by superstition, and the immoderate and blind zeal of religion; for he found that some of the Grecians which first gave the reason of thunder, had been condemned of impiety; and that the cosmographers which first discovered and described the roundness of the earth, and the consequence thereof touching the *Antipodes*, were not much otherwise censured by the ancient fathers of the Christian Church; and that the case is now much worse, in regard of the boldness of the schoolmen and their dependances in the monasteries, who having made divinity into an art, have almost incorporated the contentious philosophy of Aristotle into the body of Christian religion. And generally he perceived in men of devout simplicity, this opinion, that the secrets of nature

were the secrets of God and part of that glory whereinto the mind of man if it seek to press shall be oppressed; and that the desire in men to attain to so great and hidden knowledge, hath a resemblance with that temptation which caused the original fall: and on the other side in men of a devout policy, he noted an inclination to have the people depend upon God the more, when they are less acquainted with second causes; and to have no stirring in philosophy, lest it may lead to an innovation in divinity, or else should discover matter of further contradiction to divinity. But in this part resorting to the authority of the Scriptures, and holy examples, and to reason, he rested not satisfied alone, but much confirmed. For first he considered that the knowledge of nature, by the light whereof man discerned of every living creature, and imposed names according to their propriety, was not the occasion of the fall; but the moral knowledge of good and evil, affected to the end to depend no more upon God's commandments, but for man to direct himself; neither could he find in any Scripture, that the inquiry and science of man in any thing, under the mysteries of the Deity, is determined and restrained, but contrariwise allowed and provoked; for concerning all other knowledge the Scripture pronounceth, *That it is the glory of God to conceal, but it is the glory of man* (*or of the king*, for the king is but the excellency of man) *to invent;* and again, *The spirit of man is as the lamp of God, wherewith he searcheth every secret;* and again most effectually, *That God hath made all things beautiful and decent, according to the return of their seasons; also that he hath set the world in man's heart, and yet man cannot find out the work which God worketh from the beginning to the end;* shewing that the heart of man is a continent of that concave or capacity, wherein the content of the world (that is, all forms of the creatures and whatsoever is not God) may be placed or received; and complaining that through the variety of things and vicissitudes of times (which are but impediments and not impuissances) man cannot accomplish his invention. In precedent also he set before his eyes, that in those few memorials before the flood, the Scripture honoureth the name of the inventors of music and works in metal; that Moses had this addition of praise, that he was seen in all the learning of the Egyptians; that Solomon[1], in his grant of wisdom

[1] So spelt in MS.

from God, had contained as a branch thereof, that knowledge whereby he wrote a natural history of all verdor, from the cedar to the moss, and of all that breatheth; that the book of Job, and many places of the prophets, have great aspersion of natural philosophy; that the Church in the bosom and lap thereof, in the greatest injuries of times, ever preserved (as holy relics) the books of philosophy and all heathen learning; and that when Gregory the bishop of Rome became adverse and unjust to the memory of heathen antiquity, it was censured for pusillanimity in him, and the honour thereof soon after restored, and his own memory almost persecuted by his successor Sabinian; and lastly in our times and the ages of our fathers, when Luther and the divines of the Protestant Church on the one side, and the Jesuits on the other, have enterprised to reform, the one the doctrine, the other the discipline and manners of the Church of Rome, he saw well how both of them have awaked to their great honour and succour all human learning. And for reason, there cannot be a greater and more evident than this; that all knowledge and specially that of natural philosophy tendeth highly to the magnifying of the glory of God in his power, providence, and benefits; appearing and engraven in his works, which without this knowledge are beheld but as through a veil; for if the heavens in the body of them do declare the glory of God to the eye, much more do they in the rule and decrees of them declare it to the understanding. And another reason not inferior to this is, that the same natural philosophy principally amongst all other human knowledge doth give an excellent defence against both extremes of religion, superstition and infidelity; for both it freeth the mind from a number of weak fancies and imaginations, and it raiseth the mind to acknowledge that to God all things are possible: for to that purpose speaketh our Saviour in that first canon against heresies delivered upon the case of the resurrection, *You err, not knowing the Scriptures, nor the power of God;* teaching that there are but two fountains of heresy, not knowing the will of God revealed in the Scriptures, and not knowing the power of God revealed or at least made most sensible in his creatures. So as he saw well, that natural philosophy was of excellent use to the exaltation of the Divine Majesty; and that which is admirable, that being a remedy of superstition, it is nevertheless an help to faith. He saw like-

wise, that the former opinions to the prejudice thereof had no true ground; but must spring either out of mere ignorance, or out of an excess of devotion, to have divinity all in all, whereas it should be only above all (both which states of mind may be best pardoned); or else out of worse causes, namely out of envy, which is proud weakness and deserveth to be despised; or out of some mixture of imposture, to tell a lie for God's cause; or out of an impious diffidence, as if men should fear to discover some things in nature which might subvert faith. But still he saw well, howsoever these opinions are in right reason reproved, yet they leave not to be most effectual hindrances to natural philosophy and invention.

8. He thought also, that there wanted not great contrariety to the further discovery of sciences, in regard of the orders and customs of universities, and also in regard of common opinion. For in universities and colleges men's studies are almost confined to certain authors, from which if any dissenteth or propoundeth matter of redargution, it is enough to make him thought a person turbulent; whereas if it be well advised, there is a great difference to be made between matters contemplative and active. For in government change is suspected, though to the better; but it is natural to arts to be in perpetual agitation and growth; neither is the danger alike of new light, and of new motion or remove. And for vulgar and received opinions, nothing is more usual nor more usually complained of, than that it is imposed[1] for arrogancy and presumption for men to authorise themselves against antiquity and authors, towards whom envy is ceased, and reverence by time amortised; it not being considered what Aristotle himself did (upon whom the philosophy that now is chiefly dependeth); who came with a professed contradiction to all the world, and did put all his opinions upon his own authority and argument, and never so much as nameth an author but to confute and reprove him; and yet his success well fulfilled the observation of Him that said, *If a man come in his own name, him will you receive.* Men think likewise, that if they should give themselves to the liberty of invention and travail of inquiry, that they shall light again upon some conceits and contemplations which have been formerly offered to the world, and have been put down by better, which have prevailed and brought them to oblivion; not

[1] So MS.: a miscopy, I suspect, for *imputed.*

seeing that howsoever the property and breeding of knowledges is in great and excellent wits, yet the estimation and price of them is in the multitude, or in the inclinations of princes and great persons meanly learned. So as those knowledges are like to be received and honoured, which have their foundation in the subtility or finest trial of common sense, or such as fill the imagination; and not such knowledge as is digged out of the hard mine of history and experience, and falleth out to be in some points as adverse to common sense or popular reason, as religion, or more. Which kind of knowledge, except it be delivered with strange advantages of eloquence and power, may be likely to appear and disclose a little to the world and straight to vanish and shut again. So that time seemeth to be of the nature of a river or flood, that bringeth down to us that which is light and blown up, and sinketh and drowneth that which is solid and grave. So he saw well, that both in the state of religion, and in the administration of learning, and in common opinion, there were many and continual stops and traverses to the course of invention.

9. He thought also, that the invention of works and further possibility was prejudiced in a more special manner than that of speculative truth; for besides the impediments common to both, it hath by itself been notably hurt and discredited by the vain promises and pretences of Alchemy, Magic, Astrology, and such other arts, which (as they now pass) hold much more of imagination and belief than of sense and demonstration. But to use the poets' language, men ought to have remembered that although Ixion of a cloud in the likeness of Juno begat Centaurs and Chimæras, yet Jupiter also of the true Juno begat Vulcan and Hebe. Neither is it just to deny credit to the greatness of the acts of Alexander, because the like or more strange have been feigned of an Amadis or an Arthur, or other fabulous worthies. But though this in true reason should be, and that men ought not to make a confusion of unbelief; yet he saw well it could not otherwise be in event, but that experience of untruth had made access to truth more difficult, and that the ignominy of vanity had abated all greatness of mind.

10. He thought also, there was found in the mind of man an affection naturally bred, and fortified and furthered by discourse and doctrine, which did pervert the true proceeding towards active and operative knowledge. This was a false

estimation, that it should be as a diminution to the mind of man to be much conversant in experiences and particulars subject to sense and bound in matter, and which are laborious to search, ignoble to meditate, harsh to deliver, illiberal to practise, infinite as is supposed in number, and no ways accommodate to the glory of arts. This opinion or state of mind received much credit and strength by the school of Plato, who thinking that particulars rather revived the notions or excited the faculties of the mind, than merely informed; and having mingled his philosophy with superstition, which never favoureth the sense; extolleth too much the understanding of man in the inward light thereof. And again Aristotle's school, which giveth the due to the sense in assertion, denieth it in practice much more than that of Plato. For we see the schoolmen, Aristotle's succession, which were utterly ignorant of history, rested only upon agitation of wit; whereas Plato giveth good example of inquiry by induction and view of particulars; though in such a wandering manner as is of no force or fruit. So that he saw well, that the supposition of the sufficiency of man's mind hath lost the means thereof.[1]

[1] Here the MS. ends abruptly in the middle of the page. At the top is written in Bacon's hand "The English as much as was parfited." The blank part of the last page seems to have formed the outside of a miscellaneous bundle, and bears the following docket, also in Bacon's hand, "Severall fragments of discourses."

DE

INTERPRETATIONE NATURÆ

PROŒMIUM.

PREFACE

TO THE

DE INTERPRETATIONE NATURÆ PROŒMIUM.

THE paper that bears this title was first published by Gruter. He printed it among the *Impetus Philosophici* (concerning which see Preface to Part II. p. 3.) where it stands by itself, unconnected with the neighbouring pieces. Hence I conclude that it was one of the loose papers.

Its date may be partly inferred from the contents. Bacon speaks of himself in it as a man no longer young[1], yet not old[2]; and as one who having been a candidate (apparently without success) for office in the state, had at length resolved to abandon that pursuit and betake himself entirely to this work.[3] All this suits very well with his position in the summer of 1603, when he desired "to meddle as little as he could in the King's causes" and "put his ambition wholly upon his pen;" at which time also he was engaged on a work concerning the "Invention of Sciences," which he had digested into two parts, whereof one was entitled *Interpretatio Naturæ*. And since this Proœmium was evidently intended to stand as a general introduction to some great work bearing that title, we cannot be far wrong, I think, in placing it next to the *Advancement of Learning* and in connexion with the pieces which follow.

All that is of general application in it was afterwards digested into the first book of the *Novum Organum*. But it retains a peculiar interest for us on account of the passage in which he explains the plans and purposes of his life, and the estimate he had formed of his own character and abilities;—a passage which was replaced in the days of his greatness by a simple *De nobis ipsis silemus*. It is the only piece of autobiography in which

[1] *cum ætas jam consisteret.* [2] *hominem non senem.*

[3] *ab istis cogitationibus me prorsus alienavi et in hoc opus ex priore decreto me totum recepi.*

he ever indulged, and deserves on several accounts to be carefully considered.

When a man's life and character have any interest for posterity, it is always good to have his own account of them; for no one can tell so well what objects he proposed to himself, and how he set about to accomplish them; without a knowledge of which it must always be impossible to form a true judgment of his career. We have here Bacon's own account, written when he was between 40 and 50, of the plan upon which his life had been laid out. And if we accept it as sincere, — if we believe that such were indeed the objects which he mainly aimed at, and such the motives which mainly guided him, — the course which he actually followed in the various conjunctures of his life will present few difficulties; but will be found (after reasonable allowance made for human accidents without, and human infirmities within) very natural and consistent from first to last,—in fact a very remarkable example of constancy to an original design. He began by conceiving that a wiser method of studying nature would give man the key to all her secrets, and therewith the mastery of all her powers. If so, what boon so great could a man bestow upon his fellow-men? But the work would be long and arduous, and the event remote; and in the mean time he was not to neglect the immediate and peculiar services which as an Englishman he owed to his country and as a Protestant to his religion. He set out with the intention of doing what he could towards the discharge of all three obligations, and planned his course accordingly. With regard to the two last however, he found as life wore away that the means and opportunities which he had hoped for did not present themselves; and fearing that all would fail together if he lost more time in waiting for them, he resolved to fall back upon the first as an enterprise which depended for success upon himself alone.

So his case stood when he drew up this paper. Afterwards, though new exigencies of state gave him an opening for service and drew him again into business and politics, he did not cease to devote his leisure to the prosecution of his main object; and as soon as his fall restored to him the entire command of his time, he again made it his sole occupation.

So far therefore, his actual course was quite consistent with his first design; and it is even probable that this very constancy

was in some degree answerable for the great error and misfortune of his life. That an absorbing interest in one thing should induce negligence of others not less important, is an accident only too natural and familiar; and if he did not allow the *Novum Organum* to interfere with his attention to the causes which came before him in Chancery, it did probably prevent him from attending as carefully as he should and otherwise would have done to the proceedings of his servants and the state of his accounts.

Had his main design been successful, the story of his life would have stood simply thus, and called for no further speculation. But there is one thing (though his popular reputation as the father of modern science has prevented it from being remarked) which still remains to be explained; and which is in fact very difficult to reconcile with the opinion almost universally entertained with regard to his philosophical genius. How is it that abilities like his, applying themselves to a practical object for so many years together with such eager interest and laborious industry, met with so little success? I assume of course (what indeed cannot be reasonably doubted) that he was no mere talker or trifler, but a true workman, with genuine zeal and faith in his work. How is it then that he did not succeed, if not in accomplishing, yet in putting in a way to be accomplished, or in persuading somebody to think capable of accomplishment, some part at least of the work which he had so much at heart? If the end was unattainable, how is it that he did not find that out? If he had mistaken the way, how is it that he did not himself discover the error as he proceeded? If he failed from not well understanding the use of some of the necessary implements, why did he not apply himself to learn the use of them, or seek help from those who did understand it? He may have neglected mechanics and mathematics in his youth because he did not then know their importance; but he could hardly have proceeded far in the attempt to weigh and measure and analyse the secret forces of nature, without finding the want, long before it was too late to commence the study of them. For although, as taught at Cambridge in those days, they did not perhaps promise much help; yet in the hands of the leading scientific men of Europe they had become an instrument of too much value to have long escaped the notice of a diligent enquirer into the true condition of knowledge.

The only explanation which appears to me sufficient to account for the fact is this: Bacon's deficiency lay in the intellect itself. It seems that there was one intellectual faculty in which he was comparatively weak, and that not being himself aware of the extent and importance of the defect, he miscalculated the amount of his own forces. That he was not altogether aware of this deficiency, may be inferred I think from the remarkable passage to which I have alluded in the paper before us, and which it is worth while to examine in detail.

After considering what was the best thing to be done, he proceeds to consider what he was himself best fitted to do. He finds in himself a mind at once discursive enough to seize resemblances, and steady enough to distinguish differences; a mind eager in search, patient of doubt, fond of meditation, slow to assert, ready to reconsider, careful to dispose and set in order; not carried away either by love of novelty or by admiration of antiquity, and hating every kind of imposture; a mind therefore especially framed for the study and pursuit of truth.

Such it seems was Bacon's deliberate, candid, and sober estimate of his own qualities; and (high as it sounds) I conceive it to be, in all respects but one, a just estimate. In the large discursive faculty which detects analogies and resemblances between different and distant things, it would be difficult probably to name his equal. In the moral qualities for which he gives himself credit, he was not less eminent. His senses and powers of observation were lively and exquisite; and his judgment also, where it had to deal with the larger features of things, or with those which being too subtle and fleeting to admit of exact demonstration and analysis, must be studied by the broader light of the imagination and discursive reason, was clear and deep and sound. But it is impossible, I think, to read Mr. Ellis's remarks upon those parts of his works in which he comes in contact with what we call the *exact sciences*, —mathematics, for instance, and mechanics, — and not to feel that in the faculty of *distinguishing differences*, — the faculty whose office is (as he describes it in the *Novum Organum*, i. 55.) *figere contemplationes, et morari et hærere in omni subtilitate differentiarum*,—he was (comparatively at least) deficient. This appears both from the imperfect account of the existing condition of those sciences which he gives in the *De Augmentis*

Scientiarum; no notice being there taken of some of the most important advances which had been made by the writers immediately preceding him; and from his own experiments and speculations upon subjects which required their help. Though he paid great attention to Astronomy, discussed carefully the methods in which it ought to be studied, constructed for the satisfaction of his own mind an elaborate theory of the heavens, and listened eagerly for the news from the stars brought by Galileo's telescope, he appears to have been utterly ignorant of the discoveries which had just been made by Kepler's calculations.[1] Though he complained in 1623 of the want of compendious methods for facilitating arithmetical computations, especially with regard to the doctrine of Series, and fully recognised the importance of them as an aid to physical enquiries; he does not say a word about Napier's Logarithms, which had been published only nine years before and reprinted more than once in the interval.[2] He complained that no considerable advance had been made in Geometry beyond Euclid, without taking any notice of what had been done by Archimedes and Apollonius.[3] He saw the importance of determining accurately the specific gravities of different substances, and himself attempted to form a table of them by a rude process of his own, without knowing of the more scientific though still imperfect methods previously employed by Archimedes, Ghetaldus, and Porta.[4] He speaks of the εὑρήκα of Archimedes in a manner which implies that he did not clearly apprehend either the nature of the problem to be solved or the principles upon which the solution depended.[5] In reviewing the progress of Mechanics, he makes no mention either of Archimedes himself, or of Stevinus, Galileo, Guldinus, or Ghetaldus.[6] He makes no allusion to the theory of Equilibrium.[7] He observes that a ball of one pound weight will fall nearly as fast through the air as a ball of two, without alluding to the theory of the acceleration of falling bodies, which had been made known by Galileo more than thirty years before.[8] He proposes an inquiry with regard to the lever,—namely, whether in a balance with arms of different length but

[1] See Mr. Ellis's Preface to the *Descriptio Globi Intellectualis.*
[2] See Vol. I. p. 577. note 2.
[3] Id. ibid, note 1.
[4] See Preface to the *Historia Densi et Rari,* Vol. II. p. 233.
[5] Id. ibid.
[6] See Vol. I. p 572. note 1.
[7] Id. p. 578. note 1.
[8] Id. p. 625. note 2.

equal weight the distance from the fulcrum has any effect upon the inclination—though the theory of the lever was as well understood in his own time as it is now.[1] In making an experiment of his own to ascertain the cause of the motion of a windmill, he overlooks an obvious circumstance which makes the experiment inconclusive, and an equally obvious variation of the same experiment which would have shown him that his theory was false.[2] He speaks of the poles of the earth as fixed, in a manner which seems to imply that he was not acquainted with the precession of the equinoxes[3]; and in another place of the north pole being above, and the south pole below, as a reason why in our hemisphere the north winds predominate over the south.[4]

This list, for which I am entirely indebted to Mr. Ellis's prefaces and notes, might probably be increased; but the instances enumerated are sufficient to shew not only that Bacon was ill read in the history of these branches of learning, (and yet it was in this direction that science was making the most real and rapid advances,) but also that upon such subjects his ideas were not clear; this latter defect being no doubt the cause of the other; for where he could not readily follow the steps of the investigation, he could hardly appreciate the value of the result.

In the fact itself there would be nothing to create surprise. That of two faculties so opposite in their nature as to suggest a main division of human intellects according to their several predominance[5], the same mind should be largely endowed with one and scantily with the other, is an accident far less singular than the perfect developement in the same mind of both together. The only wonder is (since a good understanding is generally aware of its own defects) that if Bacon's was really weak in this department, he did not find the weakness out before he was five-and-forty. A sufficient explanation of this may however be found, I think, partly in the excessive activity of his discursive faculty, which coming to the rescue in every perplexity with a throng of ingenious suggestions, seduced his attention from the exact point at issue and flattered him that

[1] Vol. I. p. 638. note 2.
[2] See Preface to *Historia Ventorum*, Vol. II. p. 6.
[3] Vol. I. p. 343. note 3.
[4] Vol. II. p. 28. note 1.
[5] Maximum et velut radicale discrimen ingeniorum, quoad philosophiam et scientias, illud est: quod alia ingenia sint fortiora et aptiora ad notandas rerum differentias; alia ad notandas rerum similitudines. — *Nov. Org.* i. 55.

the time was come for a *permissio intellectus;*—partly in the great pains which he took to lay his subject out in titles, articles, sections, divisions, and subdivisions, all named and numbered; the effect of which would be to give his investigations an appearance, though a superficial and delusive one, of exact and delicate discrimination;—and partly in the magnanimous hopefulness of his nature, which inclined him to trust too much to the *labor omnia vincit* and the *possunt quia posse videntur*. As he would not believe that nature contained labyrinths impenetrable by the mind, so he would not believe that the mind contained obstructions insuperable by patient industry. And believing on the other hand as he certainly did, that the divine blessing was upon his enterprise, he accepted all delays and disappointments as nothing more than

> the protractive trials of great Jove
> To find persistive constancy in men.

But however this may be, I see no way of escaping the conclusion that his intellect was in this particular faculty originally defective; and that, whether he knew of the defect or not, he did not succeed in overcoming it.

Nor am I aware that the supposition involves any further difficulty. It does not require us to question any of his other intellectual attributes. For it is certain that as an eye which has lost the power of reading small print may yet be perfect in its judgment of form, colour, distance, and proportion; so a mind which cannot take distinct impressions of subtle and minute differences of ideas, or cannot retain such impressions long enough or easily enough for the purpose of exact comparison, may nevertheless be perfect in its power of dealing with all ideas which it can distinguish and compare. And I suppose that if Bacon could have put on a pair of intellectual spectacles, analogous in their effect on the understanding to that of clearers on an eye which is growing dim with age, he would have seen in an instant the true import and value of the reasonings of Archimedes, Copernicus, Galileo, Ghetaldo, and Kepler, and would have become aware in the same instant that he had never before really understood them. The lens through which he had been looking had not been adjusted to the object, and had transmitted a confused image to the mental retina.

The existence of this defect being once admitted and allowed for, the rest of the wonder disappears at once. Grant this, and

the question which I began by proposing is readily answered. Bacon failed to devise a practicable method for the discovery of the Forms of Nature, because he misconceived the conditions of the case; he expected to find the phenomena of nature more easily separable and distinguishable than they really are; a misconception into which a discursive intellect, an enterprising spirit, and a hopeful nature, would most naturally fall. He failed to discover his error, because in all the cases in which he tried to carry his method out, the further he advanced towards his object the more he needed the very faculty in which he was most wanting, and was baffled by the difficulties which presented themselves before he had met with any which were in their nature insuperable. For the same reason he failed even to make any single discovery which holds its place as one of the steps by which science has in any direction really advanced. The clue with which he entered the labyrinth did not reach far enough: before he had nearly attained the end, he was obliged either to come back or to go on without it. He began with an attempt to investigate the nature of *Motion* in general: the result remains in a long list of titles and divisions, exhibiting merely the plan upon which he proposed to conduct the enquiry[1]; and this plan he appears afterwards to have abandoned; for the doctrine of motion was ultimately remitted to a subordinate place in the *Novum Organum* among the Prerogatives of Instances. He then tried the nature of *Sound:* the result remains in the *Sylva Sylvarum*, in a large collection of curious observations and experiments; rough materials for an induction which he does not seem to have carried further. Finally he selected the nature of *Heat* as the subject to try his method upon, and commenced a systematic enquiry which was to be offered as a specimen of it: the result of this we have seen in the *Novum Organum;* and though he proceeded in it but a little way, it appears that he was already beginning to lose himself among the subtler phenomena which presented themselves; for it is the opinion of the best judges that he has there confounded things essentially different, and rested in conclusions not legitimately deducible from the facts from which they profess to be deduced.[2] And so no doubt it would have been in any other subject of investigation which he might have taken

[1] See *Inquisitio Legitima de Motu;* further on in this volume.

[2] See Mr. Ellis's note on the *Vindemiatio prima* (Vol. I. p. 266.); and compare Whewell, *Phil. of Ind. Sci.* book II. ch. 11.

in hand. He would soon have arrived at a point where the phenomena of nature could not be separated accurately enough for the purposes of the enquiry without instruments more delicate and exact, or modes of calculation more subtle and complicated, than any which he could have devised or used.

Nor is this the only difficulty of which we thus obtain a more natural explanation than has hitherto I think been suggested. For the same defect would interfere with his metaphysical speculations; and may serve therefore to account for the misappreciation of Aristotle with which he is now commonly charged, apparently upon good authority. It would interfere with his success as a lawyer; the law having then (very unfortunately, in my opinion) fallen entirely into the hands of men whose strength was in subtlety of distinction, and not in that broad common sense which ought (one would think) to be the ruling principle in an institution with which all classes are alike concerned; and thus it serves to account for his failure to obtain that authority in his profession to which he certainly thought himself entitled. It would interfere with his speculations in a science like political economy, and so accounts for his being so little before his age in his views with regard to usury, trade, &c. It supplies also a natural explanation of another singular fact; namely, the little communication which he seems to have had with the scientific men of his own time, and the solitude in which (as he himself complained) he was compelled to prosecute his enterprise. For we know of no man of any scientific eminence, who was either a fellow-labourer or a disciple. But the truth is that such a defect (though the perfection of his intellect in those departments where we can all more or less judge of it, coupled with his reputation for genius in regions into which few are competent to follow him, has prevented posterity from suspecting it) could hardly have escaped the notice of competent judges in his own time who knew him. And accordingly we find that William Harvey, "though he esteemed him much for his wit and style, would not allow him to be a great philosopher. 'He writes philosophy' (said Harvey to Aubrey) 'like a Lord Chancellor'—speaking in derision."[1] And it is easy to imagine that if Newton (for instance) had been a young man in Bacon's later years, they would not have been able to work together,

[1] Aubrey's Lives, ii. 281.

but would probably have kept by mutual consent respectfully aloof from each other. And this enables us to account for that silence with regard to his contemporaries for which he has been so severely censured by Coleridge and others, better than by supposing that he was either jealous of their rivalry or illiberally incredulous as to their merit. It was merely that he did not like to pronounce judgment where he did not feel that he understood the case; and if he did not take more pains to understand the case, it was only because it lay in a region in which he could not himself find conclusions which he felt that he could safely depend upon. He could follow Gilbert in his enquiries concerning the loadstone; and he was not silent about *him*, but refers to him frequently, with praise both of his industry and his method; censuring him only for endeavouring to build a universal philosophy upon so narrow a basis. So again with regard to Galileo. The direct revelations of the telescope were palpable, and he was not silent about them; but hailed the invention as a *memorabilis conatus*, — a thing *dignum humano genere:* there was no doubt that it brought within the range of vision things invisible before. But when it came to the inferences deducible from the phenomena thus revealed, he could no longer speak with confidence. It was then "hinc demonstrari *videtur*," and "quatenus fides hujusmodi demonstrationibus tuto adhiberi possit:" the language of a man who did not feel certain in his own mind whether the demonstration was conclusive or not, — which is the natural condition of a man who does not thoroughly understand it.

I need hardly add that the admission of this defect in Bacon does not in any way diminish either the value of his real services to philosophy, — of the general principles which he laid down, and those large and just views as to the nature of science and of man's mind which came out of the real depths of his own genius, — or the respect due to himself. The truths which he told must stand for ever, because they *are* truths; and until some one else shall embody them in language juster, nobler, more impressive, and more comprehensive than his, his name will stand as the author of them. And for the rest, a more correct appreciation of the difficulties with which he had to struggle, instead of diminishing our sense of what we owe him, ought only to increase our admiration of the high instinct which suggested the end, the courageous hope with which he

entered upon the pursuit of it, and the undaunted resolution with which (however unsuccessfully) he followed it up.

Another thing in the paper before us, not to be found elsewhere in Bacon's writings, is the prophecy of *civil wars;* which he anticipates *propter mores quosdam non ita pridem introductos:* a prediction well worthy of remark, especially as being uttered so early as the beginning of James the First's reign.

J. S.

DE

INTERPRETATIONE NATURÆ

PROŒMIUM.

Ego cum me ad utilitates humanas natum existimarem, et curam reipublicæ inter ea esse quæ publici sunt juris et velut undam aut auram omnibus patere interpretarer; et quid hominibus maxime conducere posset quæsivi, et ad quid ipse a natura optime factus essem deliberavi. Inveni autem nil tanti esse erga genus humanum meriti, quam novarum rerum et artium, quibus hominum vita excolatur, inventionem et auctoramentum. Nam et priscis temporibus, apud homines rudes, rudium rerum inventores et monstratores consecratos fuisse, et in deorum numerum optatos, animadverti; et acta heroum, qui vel urbes condiderunt, vel legumlatores extiterunt, vel justa imperia exercuerunt, vel injustas dominationes debellarunt, locorum et temporum angustiis circumscripta esse notavi: rerum autem inventionem, licet minoris pompæ sit res, ad universalitatis et æternitatis rationem magis accommodatam esse censui. Ante omnia vero, si quis non particulare aliquod inventum, licet magnæ utilitatis, eruat, sed in natura lumen accendat, quod ortu ipso oras rerum quæ res jam inventas contingunt illustret, dein paulo post elevatum abstrusissima quæque patefaciat et in conspectum det, is mihi humani in universum imperii propagator, libertatis vindex, necessitatum expugnator visus est. Me ipsum autem ad veritatis contemplationes, quam ad alia, magis fabrefactum deprehendi; ut qui mentem et ad rerum similitudinem (quod maximum est) agnoscendam satis mobilem, et ad differentiarum subtilitates observandas satis fixam et intentam haberem; qui et quærendi desiderium, et dubitandi patientiam, et meditandi voluptatem, et asserendi cunctationem, et resipiscendi facilitatem, et disponendi sollicitudinem tenerem; quique nec novitatem affectarem, nec anti-

quitatem admirarer, et omnem imposturam odissem. Quare naturam meam cum veritate quandam familiaritatem et cognationem habere judicavi. Attamen cum genere et educatione rebus civilibus imbutus essem, et opinionibus aliquando, utpote adolescens, labefactarer, et patriæ me aliquid peculiare, quod non ad omnes alias partes ex æquo pertineat, debere putarem, sperarcmque me, si gradum aliquem honestum in republica obtinerem, majore ingenii et industriæ subsidio quæ destinaveram perfecturum; et artes civiles didici, et qua debui modestia amicis meis, qui aliquid possent, salva ingenuitate me commendavi. Accessit et illud, quod ista, qualiacunque sint, non ultra hujusce mortalis vitæ conditionem et culturam penetrant; subiit vero spes me natum religionis statu haud admodum prospero, posse, si civilia munia obirem, et aliquid ad animarum salutem boni procurare. Sed cum studium meum ambitioni deputaretur, et ætas jam consisteret, ac valetudo affecta et malæ tarditatis meæ me admoneret, et subinde reputarem me officio meo nullo modo satisfacere, cum ea per quæ ipse hominibus per me prodesse possem omitterem, et ad ea quæ ex alieno arbitrio penderent me applicarem; ab illis cogitationibus me prorsus alienavi, et in hoc opus ex priore decreto me totum recepi. Nec mihi animum minuit, quod ejus quæ nunc in usu est doctrinæ et eruditionis, declinationem quandam et ruinam in temporum statu prospicio. Tametsi enim barbarorum incursiones non metuam (nisi forte imperium Hispanum se corroboraverit, et alios armis, se onere, oppresserit et debilitarit), tamen ex bellis civilibus (quæ mihi videntur propter mores quosdam non ita pridem introductos multas regiones peragratura), et ex sectarum malignitate, et ex compendiariis istis artificiis et cautelis quæ in eruditionis locum surrepserunt, non minor in literas et scientias procella videbatur impendere. Nec typographorum officina his malis sufficere queat. Atque ista quidem imbellis doctrina, quæ otio alitur, præmio et laude efflorescit, quæ vehementiam opinionis non sustinet, et artificiis et imposturis cluditur, iis quæ dixi impedimentis obruitur. Longe alia ratio est scientiæ, cujus dignitas utilitatibus et operibus munitur. Ac de temporum injuriis fere securus sum, de hominum vero injuriis non laboro. Si quis enim me nimis altum sapere dicat, respondeo simpliciter, in civilibus rebus esse modestiæ locum, in contemplationibus veritati. Si quis vero opera statim exigat, aio sine omni impostura, me hominem non senem

valetudinarium, civilibus studiis implicatum, rem omnium obscurissimam sine duce ac luce aggressum, satis profecisse si machinam ipsam ac fabricam exstruxerim, licet eam non exercuerim aut moverim. Ac eodem candore profiteor, interpretationem naturæ legitimam, in primo adscensu antequam ad gradum certum generalium perventum sit, ab omni applicatione ad opera puram ac sejunctam servari debere. Quin et eos omnes qui experientiæ se undis aliqua ex parte dediderunt, cum animo parum firmi aut ostentationis cupidi essent, in introitu operum pignora intempestive investigasse, et inde exturbatos et naufragos fuisse scio. Si quis autem pollicitationes saltem particulares requirat, is noverit homines per eam quæ nunc in usu est scientiam ne satis doctos ad optandum quidem esse. Quod autem minoris momenti res est, si quis ex politicis judicium suum in istiusmodi re inserere præsumat, quibus moris est ex personæ calculis singula æstimare vel ex similis conatus exemplis conjecturam facere, illi dictum volo et illud vetus, claudum in via cursorem extra viam antevertere, et de exemplis non cogitandum, rem enim sine exemplo esse. Publicandi autem ista ratio ea est, ut quæ ad ingeniorum correspondentias captandas et mentium areas purgandas pertinent, edantur in vulgus et per ora volitent; reliqua per manus tradantur cum electione et judicio. Nec me latet usitatum et tritum esse impostorum artificium, ut quædam a vulgo secernant, nihilo iis ineptiis quas vulgo propinant meliora. Sed ego sine omni impostura ex providentia sana prospicio, ipsam interpretationis formulam et inventa per eandem, intra legitima et optata ingenia clausa, vegetiora et munitiora futura. Ipse vero alieno periculo ista molior. Mihi enim nil eorum quæ ab externis pendent cordi est. Neque enim famæ auceps sum, nec hæresiarcharum more sectam condere gratum habeo, et privatum aliquod emolumentum ex tanta molitione captare ridiculum et turpe duco. Mihi sufficit meriti conscientia, et ipsa illa rerum effectio, cui ne fortuna ipsa intercedere possit.

TEMPORIS PARTUS MASCULUS.

PREFACE

TO THE

TEMPORIS PARTUS MASCULUS.

At the end of the manuscript of the *Valerius Terminus*, and immediately following it in the same page, in the hand of the same transcriber, I find the title and the first chapter of the piece which follows; and in the list of contents inserted by Bacon himself at the beginning of the manuscript, I find them thus described: "The first chapter of a book of the same argument, written in Latin, and destined to be separate and not public." The design and commencement of the work may therefore, in default of other evidence, be safely referred to the time when Bacon revised the manuscript of *Valerius Terminus*.

Again, in Gruter's *Scripta Philosophica* I find this same first chapter inserted, though not in connexion with the general title, among the *Impetus Philosophici*, and followed by another which is headed simply *Caput secundum*, without any other description; whence I conclude that the two were found by Gruter together, as if forming one piece. If so, the general title, which certainly belongs to the first, may be safely extended to both: and accordingly they are printed here as the first and second chapters of the *Temporis Partus Masculus*.

But in another part of Gruter's book, — *i. e.* on the back of the titlepage and placed there by itself as a kind of frontispiece to the volume, — I find a short Latin prayer, with the words "Temporis Partus Masculus, *sive Instauratio Magna imperii humani in Universum*," printed at the head of it. And as this title cannot be applied with any propriety to the general contents of the volume, I conclude that the prayer in question was found by Gruter so headed, on a separate sheet; and that he placed it there by itself, not knowing what particular piece

to connect it with. The manuscript of *Valerius Terminus* removes the difficulty. Knowing as we do the proper title of the two chapters above mentioned, we need not hesitate to connect the prayer with them, and to place it in front of them; where, though very likely written later, it was probably intended to stand.

So far I follow the example of M. Bouillet. But with regard to two other fragments — namely the *Aphorismi et Consilia*, and the *De Interpretatione Naturæ Sententiæ XII.* — which he has included under the same title, I find no sufficient authority for his proceeding. If indeed the typographical arrangement of Gruter's volume could be trusted as a true indication of the arrangement of the manuscripts from which he printed it, we should be obliged to consider the *Sententiæ XII.* as immediately connected with the chapter headed *Tradendi Modus Legitimus*, and introductory to it. But his book is put together with so little care or skill in that respect, and shows so little editorial capacity of any kind, that I do not think any such inference can be safely drawn. And I see no apparent connexion between the two writings except such as necessarily arises from their relation to a common subject, and from their being both addressed to a disciple, or son.

With regard to the date of composition, it will be observed that my reasons for connecting the *Temporis Partus Masculus* with the *Valerius Terminus* and placing it next in order to the *Advancement of Learning*, apply only to the first chapter and the general design as indicated in the title. The *second* chapter may, for anything that appears, have been added at a much later period. And I am myself much inclined to suspect that it was not written before the summer of 1608.

Its object is to explode the various philosophical systems or theories which had been previously propounded; being the first and principal part of the doctrine of the Idols of the Theatre, — a part which, though not directly noticed in the *Advancement of Learning*, assumed soon after so prominent a place in Bacon's scheme that he resolved to place it in the very front of his battle. "Itaque *primus* imponitur labor (he says in the *Partis Secundæ Delineatio*) ut omnis ista militia theoriarum, quæ tantas dedit pugnas, mittatur ac relegetur." This *primus labor* is what he here begins with. He goes over the same ground in another paper entitled *Redargutio Philoso-*

phiarum, and again in the *Novum Organum*. And upon a comparison of the three, there can be little doubt that this is the earliest. But besides its being more crude, there is a specific peculiarity in the style and manner of this piece which requires explanation. All Bacon's other writings are marked with the gentleness and modesty which are said to have distinguished his demeanour and conversation, and which were no doubt natural to him. In those which deal with the errors of received opinions in philosophy, he is profuse even to ostentation in professions of respect and deference for the authors of them, and in disclaiming for himself all pretensions to rivalry in abilities or authority. Here for once he assumes a tone quite different; entering abruptly into the subject in a spirit of contemptuous invective, not to call it presumptuous and insolent, of which in all his writings, public or private, I remember no other example. How is this to be accounted for? I cannot help thinking that it was one of those *experiments* which I have spoken of in my general preface to the third part of the Philosophical works, — experiments in the art of commanding audiences and winning disciples, — and that the key to the true explanation of it may be found in a memorandum set down by himself in July 1608. To assist his memory, and perhaps also to excite his thoughts, he was in the habit of jotting down in commonplace books such reflexions and suggestions as occurred to him on the sudden. These he would review from time to time, and enter in a fresh book such of them as he thought worth preserving. At the end of July 1608, the business of term being over and a considerable accession to his income having just fallen in, he seems to have spent three or four days in this occupation, — reviewing all his affairs in turn and endeavouring to set the clock of his life anew; and the record of his meditations has fortunately been preserved. This is the book to which I have already so often referred by the name of *Commentarius Solutus*, and which will be printed in its place among the Occasional Works. The notes which it contains, and which are evidently set down solely for his own private memory and instruction, refer to a great variety of subjects; among which the progress of his philosophy has a prominent place. Of these a large proportion are in the nature of queries and points for consideration; as for instance, what parts of the work to proceed with next, and how; what persons to seek acquaintance

with for assistance and co-operation; what points to press and what opinions to nourish and work upon, and the like; all set down promiscuously as they occurred. Among the rest I find the following: "*Discoursing scornfully* of the philosophy of the Grecians, with some better respect to the Ægyptians, Persians, Caldees, and the utmost antiquity, and the mysteries of the poets;" and again, a little further on, "*Taking a greater confidence and authority* in discourses of this nature, *tanquam sui certus et de alto despiciens.*"

Now putting these two memoranda together, we see the germ of an idea which might easily and naturally lead to the composition, as an experiment, of the second chapter of the *Temporis Partus Masculus*. Finding that the simple proposition of his views was not winning converts, he had a mind to try what effect might be produced by putting them forward in a tone of confidence and superiority, and so threw his argument into the form in which we have it here. The idea was not absurd: for it is not less true in speculative than in practical matters that the short way to obtain authority among men is to assume it boldly; and the text "If a man come in his own name him ye will receive," though applied by Bacon to the Aristotelian philosophy as contrasted with his own, has in fact been verified not less remarkably in himself. This first experiment however he seems to have regarded as a failure; for he soon after recast the argument in another form, leaving out all that was scornful and offensive towards others, and retaining only that tone of lofty confidence in the worth of his own speculations which grew naturally out of his profound conviction of their truth.

I have thought this conjecture of mine worth recording, because if this be the true history of the composition it gives it a new and peculiar interest, and should be taken along with us as we read. It has however another interest besides, as containing many opinions which Bacon has not expressed elsewhere; and though the manner of announcing them is affected, the opinions are no doubt his own, — whatever be the value of them.

The notes to this work are all Mr. Ellis's.

J. S.

TEMPORIS PARTUS MASCULUS

SIVE

INSTAURATIO MAGNA IMPERII HUMANI IN UNIVERSUM.

Ad Deum Patrem, Deum Verbum, Deum Spiritum, preces fundimus humillimas et ardentissimas, ut humani generis ærumnarum memores et peregrinationis istius vitæ nostræ in qua dies malos et paucos terimus, nova adhuc refrigeria e fontibus bonitatis suæ ad miserias nostras leniendas aperiant; atque illud insuper, ne humana divinis officiant, neve ex reseratione viarum Sensus et accensione majore luminis Naturalis aliquid incredulitatis et noctis animis nostris erga divina mysteria oboriatur; sed potius ut ab Intellectu a phantasiis et vanitate puro et repurgato, et divinis oraculis nihilominus subdito et prorsus dedititio, Fidei dentur quæ Fidei sunt.

TEMPORIS PARTUS MASCULUS,

SIVE DE INTERPRETATIONE NATURÆ LIB. 3.[1]

1. Perpolitio et applicatio mentis.
2. Lumen Naturæ; seu formula Interpretationis.
3. Natura Illuminata; sive veritas rerum.

CAPUT PRIMUM.

Tradendi modus legitimus.

Reperio (fili) complures in rerum scientia quam sibi videntur adepti vel profcrenda vel rursus occultanda, neutiquam e fide sua ac officio se gerere. Eodem damno, licet culpa fortasse minore, peccant et illi, qui probe quidem morati sed minus prudentes sunt, nec artem ac præcepta tenent quo quæque modo sint proponenda. Neque tamen de hac tradentium scientias sive malignitate sive inscitia querela est instituenda. Sane si rerum pondera docendi imperitia fregissent, non immerito quis indignetur; rerum vero ineptiis docendi importunitatem vel jure deberi existimandum est. Ego autem longe ab his diversus te[2] impertiturus, non ingenii commenta, nec verborum umbras, nec religionem admistam, nec observationes quasdam populares, vel experimenta quædam nobilia in theoriæ fabulas concinnata; sed revera naturam cum fetibus suis tibi addicturus et mancipaturus; num videor dignum argumentum præ manibus habere, quod tractandi vel ambitione vel inscitia vel vitio quovis polluam? Ita sim (fili) itaque humani in universum imperii angustias nunquam satis deploratas ad datos fines proferam (quod mihi ex humanis solum in votis est), ut tibi optima fide, atque ex altissima mentis meæ providentia, et exploratissimo rerum et animorum statu, hæc traditurus sim[3] modo omnium

[1] *i. e. libri tres.* — *J. S.*

[2] *te* ought to be *tibi.* Bacon perhaps thought that *impertio*, being here used as a verb of teaching, might govern an accusative of the person. But there seems to be no authority for this construction. [I suspect *te* to be merely a miscopy for *et.* — *J. S.*]

[3] So in the original; a mistake probably for *sum.* — *J. S.*

maxime legitimo. Quis tandem (inquies) est modus ille legitimus? Quin tu mitte artes et ambages, rem exhibe nudam nobis, ut judicio nostro uti possimus. Atque utinam (fili suavissime) eo loco sint res vestræ, ut hoc fieri posset. An tu censes, cum omnes omnium mentium aditus ac meatus obscurissimis idolis, iisque alte hærentibus et inustis, obsessi et obstructi sint, veris rerum et nativis radiis sinceras et politas areas adesse? Nova est ineunda ratio, qua mentibus obductissimis illabi possimus. Ut enim phreneticorum deliramenta arte et ingenio subvertuntur, vi et contentione efferantur, omnino ita in hac universali insania mos gerendus est. Quid? leviores illæ conditiones, quæ ad legitimum scientiæ tradendæ modum pertinent, an tibi tam expeditæ et faciles videntur? ut modus innocens sit, di est, nulli prorsus errori ansam et occasionem præbeat? ut vim quandam insitam et innatam habeat tum ad fidem conciliandam, tum ad pellendas injurias temporis, adeo ut scientia ita tradita veluti planta vivax et vegeta quotidie serpat et adolescat? ut idoneum et legitimum sibi lectorem seponat, et quasi adoptet? Atque hæc omnia præstiterim necne, ad tempus futurum provoco.

CAPUT SECUNDUM.

Plane autem non dissimulo (fili) mihi quopiam submovendos esse philosophastros istos poëtis ipsis fabulosiores, stupratores animorum, rerum falsarios, et multo etiam magis horum satellites et parasitos, professoriam illam et meritoriam turbam. Quis carmen præit, ut hos [1] oblivioni devoveam? quod enim veritati silentium, si isti brutis suis et inarticulatis rationibus obstrepant? Verum tutius forsitan fuerit nominatim eos damnare, ne, cum tanta authoritate vigeant, non nominati excepti videantur; neve quis putet cum inter ipsos tam gravia et internecina exerceantur odia et tanta dimicatione certetur, me ad has larvarum et umbrarum pugnas alteri parti velut subsidio missum. Itaque citetur Aristoteles, pessimus sophista, inutili subtilitate attonitus, verborum vile ludibrium.[2] Ausus etiam, tum cum forte

[1] [*hoc* in original.] The meaning of the phrase is, "Who will repeat before me the form of words whereby I may devote these persons to oblivion?" *hoc* being manifestly a wrong reading for *hos*. Compare Liv. viii. 9.: Agedum pontifex publicus populi R. *præi verba quibus me pro legionibus devoveam.*

[2] Compare what Bacon has himself said in the *Redargutio Philosophiarum:* "Ita-

mens humana ad veritatem aliquam casu quopiam tanquam secunda tempestate delata acquiesceret, injicere durissimas animis compedes, artemque quandam insaniæ componere, nosque verbis addicere. Quin et ex istius sinu educti nobis sunt ac enutriti vaferrimi illi nugatores, qui cum a perambulatione mundana ac omni rerum ac historiæ luce se avertissent, ex hujus maxime præceptorum et positionum ductili admodum materia, et ingenii inquieta agitatione, numerosissimas scholarum quisquilias nobis exhibuere. Iste autem horum Dictator tanto illis accusatior, quod etiam in historiæ apertis versatus, subterraneæ alicujus specus opacissima idola retulit; atque super ipsam quidem historiam rerum particularium quasdam veluti operas aranearum extruxit, quas causas videri vult, cum sint nullius prorsus roboris vel pretii. Quales etiam nostra ætate multa cum satagentia fabricavit Hieronymus Cardanus, uterque rebus ac sibi discors. Ne vero (fili) cum hanc contra Aristotelem sententiam fero, me cum rebelle ejus quodam neoterico Petro Ramo conspirasse augurere. Nullum mihi commercium cum hoc ignorantiæ latibulo [1], perniciosissima literarum tinea, compendiorum patre, qui cum methodi suæ et compendii vinclis res torqueat et premat, res quidem, si qua fuit, elabitur protinus et exilit; ipse vero aridas et desertissimas nugas stringit. Atque Aquinas quidem cum Scoto et sociis etiam in non rebus rerum varietatem effinxit, hic vero etiam in rebus non rerum solitudinem æquavit. Atque hoc hominis cum sit, humanos tamen usus in ore habet impudens, ut mihi etiam pro sophistis prævaricari videatur. Verum hos missos faciamus. Citetur jam et Plato, cavillator urbanus, tumidus poëta, theologus mente captus. Tu certe dum rumores nescio quos philosophicos limares et simul committeres, ac scientiam dissimulando simulares, animosque vagis inductionibus tentares et exsolveres, vel literatorum vel civilium virorum conviviis sermones, vel etiam sermonibus quotidianis gratiam et amorem subministrare potuisti. Verum cum veritatem humanæ mentis incolam veluti indigenam nec aliunde commigrantem mentireris, animosque nostros, ad histo-

que hos duos viros, Platonem et Aristotelem, si quis inter maxima mortalium ingenia non numerat, aut minus perspicit aut minus æquus est." " There never breathed," says Selden in speaking of Aristotle, " that person to whom mankind was more beholden." (*Table Talk*, § *Truth*): a statement which is certainly much nearer the truth than that of the text.

[1] From Ramus however Bacon derived some part of his philosophical terminology; particularly his use of the word *axioma* as equivalent to *enuntiatum*. It is to be observed that he has mentioned Ramus's system, at least a portion of it, with commendation both in *Valerius Terminus* and in the *De Augmentis*.

riam et res ipsas nunquam satis applicatos et reductos, averteres, ac se subingredi, ac in suis cæcis et confusissimis idolis volutare contemplationis nomine doceres, tum demum fraudem capitalem admisisti. Deinde etiam tu scelere haud minore stultitiæ apotheosin introduxisti, et vilissimas cogitationes religione munire ausus es. Nam levius malum est, quod philologorum parens extitisti, ac tuo ductu et auspiciis plurimi, ingenii fama et cognitionis rerum populari et molli jucunditate capti et contenti, severiorem veri pervestigationem corruperunt. Inter quos fuere Marcus Cicero et Annæus Seneca et Plutarchus Chæroneus, et complures alii neutiquam his pares. Nunc ad Medicos pergamus. Video Galenum, virum angustissimi animi, desertorem experientiæ, et vanissimum causatorem. Tune, Galene, is es, qui medicorum inscitiam et desidiam etiam infamiæ eximis, et in tuto collocas, artis ac officii eorum finitor ignavissimus? qui tot morbos insanabiles statuendo, tot ægrotorum capita proscribis, horumque spem, illorum industriam præcidis? O canicula! O pestis! Tu mistionis commentum naturæ prærogativam[1]; tu inter calores astri et ignis seditionem avide arripiens et ostentans, ubique humanam potestatem malitiose in ordinem redigis, et ignorantiam desperatione in æternum munire cupis. Do indignitati tuæ ne te amplius morer. Abducas etiam tecum licet socios tuos et fœderatos Arabes, dispensatoriorum conditores, qui, pari cum cæteris in theoriis amentia, copiosius quidem e supinissimis conjecturis medicinarum vulgarium pollicita magis quam auxilia composuere. Nec non cape comites perfunctoriam Neotericorum turbam. Heus nomenclator, suggere. Atqui respondet, ne dignos esse quorum nomina teneat. Sane ut inter hujuscemodi nugatores gradus quosdam agnosco, pessimum et absurdissimum genus eorum, qui methodo et acribologia universam artem comprehendunt, quibus vulgo ob elocutionem et ordinem applauditur; qualis est Fernelius.[2] Minus

[1] Galen contrasts the inwardly formative power of nature with the (so to speak) external operations of art, in his treatise *De Natural. Facultatibus*. See vol. ii. p. 82. of Kühn's edition of Galen. He elsewhere points out the differences which he conceives to exist between animal heat and that of a fire; but I am not aware that he speaks of the heterogeneity of terrestrial and astral heat. See his treatise De Marasmo, c. 4.

[2] Fernelius, who was born near the close of the fifteenth century, and who died in 1558, was physician to Henry II. He was greatly distinguished both as a writer on medicine and as a physician. He was moreover, notwithstanding the contempt with which he is here mentioned, well seen in mathematical and natural science, and was the first person who in modern times attempted to determine the magnitude of the

incommodi sunt, qui majorem observationum et experimentorum varietatem et proprietatem ostendunt, licet stultissimis causationibus dilutam et immersam, ut Arnoldus de Villa Nova, et alii id genus.[1] Intueor ab altera parte cohortem Chymistarum, inter quos se ante alios jactat Paracelsus, qui audacia meruit ut separatim coërcetur. Atque superiores illi, quos modo perstrinximus, mendacia; tu monstra. Quæ tu novis Bacchi oracula in meteoricis fundis, æmule Epicuri?[2] Ille tamen in hac parte tamquam indormiscens et aliud agens opiniones veluti sorti committit. Tu omni sorte stultior in absurdissimi cujusque mendacii verba jurare paratus es. Verum alia tua videamus. Quas tu fructuum elementorum tuorum inter se imitationes? quas correspondentias? quæ parallela somnias, idolorum conjugator fanatice? Nam hominem scilicet pantomimum effecisti.[3] Quam præclaræ autem sunt interpunctiones illæ quibus naturæ unitatem lacerasti, species nimirum tuæ? Quare facilius Galenum fero elementa sua ponderantem, quam te somnia tua ornantem. Illum enim occultæ rerum proprietates, te communes et promiscuæ qualitates exagitant.[4] Nos interim miseros, qui inter tam odiosas ineptias degimus! Principiorum autem triadem[5], commentum haud ita prorsus inutile et rebus

earth. He seems to have been singularly diligent in his calling and in his studies; and it is said that when he was advised to give himself more time for repose, he would make answer in the words of Ovid, "Longa quiescendi tempora fata dabunt."

[1] Arnaldus de Villâ Novâ lived towards the end of the thirteenth century. He was an alchemist, and was accused of being a magician. It is said that he professed medicine at Montpellier; and probably he took his name from Villeneuve, which is not far from it. Brantôme (De la Vue, &c.) makes Raymond Lully his disciple. Villa Nova's best known work is the commentary on the *Regimen Sanitatis Scholæ Salernitanæ* Sir Alexander Croke has given some specimens of it in his edition of the *Regimen*. It is in some places sufficiently fanciful. The line

Unica nux prodest, nocet altera, tertia mors est.

of which the real meaning seems plain, is made to imply that the nutmeg or *nux moschata* is medicinal, the walnut unwholesome, and the nut or catch of the crossbow deadly. In the phrase "alii id genus" it is probable that a reference is intended to Roger Bacon.

[2] This very obscure sentence appears to be corrupt. It is probable that *novis* ought to be *novi* or *novioris*. But it is difficult with any probable alteration to obtain an intelligible meaning. [For *novis* read *nobis*?—*J. S.*]

[3] Paracelsus's doctrine of the microcosm is here alluded to. It recurs throughout his writings, but is stated more definitely than usual in the first book of his Philosophia Sagax, ii. p. 532. of his philosophical writings. See the same work, p. 553. for a statement of the fruits educed from each of the four elements by the generating power of the sun.

[4] The meaning is that Galen seeking to explain the qualities of bodies by means of the qualities of the elements of which the bodies are composed, lost sight of or neglected all which cannot be thus explained; whereas Paracelsus, by referring them to the specific and peculiar nature of the body, made it impossible to arrive at any general conclusion respecting them, since the qualities of each body were to him ultimate facts.

[5] Namely salt, sulphur, and mercury.

aliqua ex parte finitimum, quam importune inculcat homo imposturæ peritissimus? Audi adhuc crimina graviora. Tu divina naturalibus, sacris profana, fabulis hæreses miscendo, veritatem (sacrilege impostor) tum humanam tum religiosam polluisti. Tu lumen naturæ (cujus sanctissimum nomen toties impuro ore usurpas) non abscondisti, ut Sophistæ, sed exstinxisti. Illi experientiæ desertores, tu proditor. Tu evidentiam rerum crudam et personatam contemplationi ex præscripto subjiciens, et substantiarum Proteos pro motuum calculis quærens, scientiæ fontes corrumpere et humanam mentem exuere conatus es; et ambages et tædia experimentorum, quibus Sophistæ adversi, Empirici impares sunt, novis et adscititiis auxisti; tantum abest ut experientiæ repræsentativam secutus sis, aut noveris. Nec non Magorum hiatus ubique pro viribus amplificasti, importunissimas cogitationes spe, spem promissis premens, imposturæ tum artifex tum opus. Invideo tibi (Paracelse) e sectatoribus tuis unum Petrum Severinum [1], virum non dignum qui istis ineptiis immoriatur. Tu certe, Paracelse, ei plurimum debes, quod ea quæ tu (asinorum adoptive) rudere consueveras, cantu quodam et modulatione, et gratissimo vocum discrimine, jucunda et harmonica effecit, et mendaciorum odia in fabellæ oblectamenta traduxit. Tibi vero, Severine, veniam do, si Sophistarum doctrinam, non solum operum effœtam, verum desperationem ex professo captantem pertæsus, alia rebus nostris labentibus firmamenta quæsivisti. Cumque Paracelsica ista se obtulissent et ostentationum præconiis et obscuritatis subterfugiis et religionis affinitatibus et alio fuco commendata, te in hos [2], non rerum fontes sed spei hiatus, jactu quodam indignationis dedisti. Rite et ordine feceris, si ab ingenii placitis ad naturæ scita te transtuleris, tibi non modo artem brevem sed et vitam longam porrectura. Jam cæteros Chymistas sententia in Paracelsum lata defixos cerno obstupescere. Agnoscunt profecto decreta sua, quæ iste magis promulgavit quam posuit, ac arrogantia pro cautelis (haud plane ex antiqua disciplina) communivit: ubi sane magna mentiendi reciprocatione inter se conciliati largas ubique spes

[1] Peter Severinus was born in 1542 at Ripen in Denmark, and died in 1602. Neither Haller nor Sprengel speak of him as favourably as Bacon; nor does he seem to have had any great share of reputation; at least he is not mentioned in the common biographical dictionaries. His only known work is the *Idea Medicinæ Philosophicæ*, to which Bacon here refers. He is not to be confounded with M. A. Severinus.

[2] *hoc* in original. —*J. S.*

ostentant, et per experientiæ quidem devia vagi, in quædam utilia, casu non ductu, quandoque impinguntur. In theoriis vero iisdem[1] ab arte sua (utpote fornacis discipuli) non recesserunt. Verum ut delicatus ille adolescentulus, cum scalmum in littore reperisset, navem ædificare concupivit; ita carbonarii isti ex pauculis distillationum experimentis philosophiam condere aggressi sunt, ubique istis separationum et liberationum absentissimis[2] idolis obnoxiam. Nec hos tamen uno ordine omnes habeo. Siquidem utile genus eorum est, qui de theoriis non admodum solliciti, mechanica quadam subtilitate rerum inventarum extensiones prehendunt; qualis est Bacon.[3] Sceleratum et sacrum eorum, qui undique theoriis suis plausus conquirunt, ambientibus etiam et pro iis supplicantibus religione, spe, et impostura. Talis est Isaac Hollandus[4], et turbæ Chymistarum pars longe maxima. Age citetur jam Hippocrates, antiquitatis creatura et annorum venditor. In cujus viri authoritatem cum Galenus et Paracelsus magno uterque studio, velut in umbram asini, se recipere contendat, quis non cachinnum tollat? Atque iste homo certe in experientia obtutu perpetuo hærere videtur, verum oculis non natantibus et anquirentibus, sed stupidis et resolutis. Deinde a stupore visu parum recollecto, idola quædam, non immania quidem illa theoriarum, sed elegantiora ista quæ superficiem historiæ circumstant, excipit; quibus haustis tumens et semisophista, et brevitate (de illius ætatis more) tectus, oracula demum (ut his placet) pandit, quorum ii se interpretes haberi ambiunt; cum revera nihil aliud agat, quam aut sophistica quæ-

[1] So in original. qu. *iidem*? — *J. S.*

[2] So in original. — *J. S.*

[3] Roger Bacon, whom his namesake has here so faintly praised, was beyond all doubt one of the greatest men of the age in which he lived. He was born in 1214 at Ilchester, and died in 1292 or 1294. One of the most remarkable circumstances connected with him is the influence which a passage in the *Opus Majus* exercised on Columbus, who perhaps had never heard of him. Peter de Alliaco, whose *Imago Mundi* was compiled in 1410, transcribed almost literally, but without acknowledgment, from Roger Bacon a passage (containing quotations in favour of the possibility of reaching India by sailing westward, from Aristotle, Pliny, and Seneca) which seems to have made a profound impression on Columbus; who, as Humboldt remarks, was familiar with the *Imago Mundi*. Compare the three passages; viz. the passage in the *Opus Majus*, that in the *Imago Mundi*, and that contained in the letter which Columbus wrote to Ferdinand and Isabella from Haiti, given by Humboldt, vol. i. p. 65. of his *Examen Critique de l'Histoire de la Géographie.*

[4] Very little is known of Isaac Hollandus. He is said by Suertius (*Athenæ Belgicæ*) to have been a native of the Netherlands, and to have published in 1582 a work entitled "Abdita quædam de Opere Animali et Vegetabili." But Sprengel speaks of Isaac Hollandus as one of the precursors of Paracelsus. There is also a John Isaac, said to be a son of Isaac's. See Sprengel Hist. Medic. iii. 270. I have not seen Adami, to whom Sprengel refers.

dam per abruptas et suspensas sententias tradens redargutioni subducat, aut rusticorum observationes supercilio donet. Atque ad hujus quidem viri instituta, non tam improba quam inutilia, proxime (ut etiam vulgo creditur) accedit Cornelius Celsus; sed intentior sophista, et historiæ modificatæ magis obstrictus, idem moralem moderationem scientiæ progressibus aspergens, et errorum extrema amputans, non prima evellens. Atque de istis verissima quidem hæc sunt. Nunc autem sciscitantem te audio (fili) an non forte deteriora, ut fit, voluere; præsertim cum status scientiæ sit semper fere democraticus? An non tempus veluti flumen levia et inflata ad nos devexit, solida et gravia demersit? Quid veteres illi veritatis inquisitores Heraclitus, Democritus, Pythagoras, Anaxagoras, Empedocles, et alii, alienis non propriis scriptis noti? Quid denique de silentio et secretis antiquitatis statuis? Ego (fili) ut tibi (ex more meo, id est usu tuo) respondeam, antiquitatis fragmentum unum aut alterum (inventorum dico non librorum) agnosco: idque ipsum tamen magis ut diligentiæ et ingenuitatis specimen, quam scientiæ authoris. De iis vero rebus, quæ cum vestigiis suis aufugere, si innuerem laboriosa esse ista conjecturarum aucupia, nec consentaneum me utilitates in posterum humano generi parantem ad antiquitatis philologiam retrogredi, sat scio pro modestia tua acquiesceres. Veruntamen ut perspicere possis quam res præsentes bifrontes vates sint, quamque et futuras et præteritas coram sistant, decrevi utriusque temporis tabulis (quæ non tantum scientiæ decursus et fluxus, sed et alios rerum provisus complectantur) tibi gratificari. Neque tu hoc quale sit (antequam videas) augurere; non enim cadit in te vera hujusce rei anticipatio; nec si minus ad manus tuas veniat, requiras. Gratificor enim (inquam) quibusdam vestrum hac in re (fili) et delicatioribus spiritus concilio. Omnino scientia ex naturæ lumine petenda, non ex antiquitatis obscuritate repetenda est. Nec refert quid factum fuerit; illud videndum, quid fieri possit. An tu, si regnum tibi armis et victori bello subjugatum traderetur, quæstiones necteres utrum majores tui illud tenuerint necne, et genealogiarum rumores solicitares? Atque hæc de antiquitatis penetralibus dicta sunt. De istis vero sectarum ducibus, quos nominasti, et compluribus aliis id genus, facilis sententia est. Errori varietas, veritati unitas competit. Ac nisi temporum politiæ et provisus ejusmodi ingeniorum peregrinationibus adversiores extitissent,

multæ etiam aliæ errorum oræ fuissent peragratæ. Immensum enim pelagus veritatis insulam circumluit; et supersunt adhuc novæ ventorum idolorum injuriæ et disjectiones. Quinetiam nudiustertius Bernardinus Telesius scenam conscendit, et fabulam novam egit, nec plausu celebrem, nec argumento elegantem. An non vides (fili) tum eccentricorum et epicyclorum ingeniatores, tum terræ aurigas, æqua et ancipiti phænomenorum advocatione gaudere? Prorsus ita et in universalibus theoriis fit. Nam veluti si quis lingua tantum vernacula uti sciens (adverte, fili, nam simile est admodum) scripturam ignoti sermonis capiat, ubi paucula quædam verba sparsim observans suæ linguæ vocabulis sono et literis finitima, illa quidem statim ac fidenter ejusdem esse significationis ponit (licet ab ea sæpius longissime recedant), postea ex iis invicem collatis reliquum orationis sensum multo ingenii labore, sed et multa libertate, divinat; omnino tales et isti naturæ interpretes inveniuntur. Nam idola quisque sua (non jam scenæ dico, sed præcipue fori et specus [1]), veluti linguas vernaculas diversas, ad historiam afferentes, confestim quæ simile aliquid sonant arripiunt; cætera ex horum symmetria interpretantur. Atque jam tempus est (fili) ut nos recipiamus et expiemus, utpote qui tam profana et polluta (licet importandi [2] animo) attrectaverimus. Ego vero adversus istos omnes minora quam pro ipsorum sontissimo reatu dixi. Tu tamen fortasse minus istam redargutionem intelligis. Nam pro certo habeas (fili) sententias istas quas adversus istos tuli, nihil minus esse quam contumeliam. Ego enim non ut Velleius apud Ciceronem, declamator et philologus opiniones cursim perstringens, et magis abjiciens quam frangens; vel ut Agrippa, neotericus homo, in istiusmodi sermone ne nominandus quidem, sed trivialis scurra, et singula distorquens et lusui propinans (me miserum, qui hominum defectu cum brutis me conferre necesse habeam!) [3]; ita me gessi. Verum sub maledicti velo miras ac-

[1] Only three species of idols are here noticed — that of the tribe being omitted. In the *Advancement of Learning* three kinds of idols are mentioned, but not by name. It seems however as if the third kind includes two of the species mentioned in the *Novum Organum;* namely the idols of the forum, and those of the theatre. In *Valerius Terminus* four kinds of idols are mentioned: those here and subsequently called idols of the forum being there called idols of the palace.

[2] *improbandi?*

[3] Of Cornelius Agrippa, thus contemptuously condemned, Jöcher's judgement is "Er war ein aufrichtiger, unerschrockener und grossmüthiger Mann. Seine Naturgaben waren ganz besonder, und seine Erfahrenheit in allen Wissenschaften ungemein." He was born at Cologne in 1486, and died in 1535. His best known work is the treatise *De Incertudine et Vanitate Scientiarum* from which Bacon has apparently borrowed, though not largely, in the *Advancement of Learning.*

cusationum animas, et singulari artificio in singula fere verba contractas et reductas, et exquisitissima oculi acie in ipsa criminum ulcera directas et vibratas, postmodum respiciens videbis. Atque cum isti criminibus et reatu valde inter se mixti et implicati forent, tamen singulos indiciis maxime propriis, iisdem autem capitalibus, reos feci. Mens enim humana (fili) rerum incursibus et observationibus turgida varias admodum errorum species molitur et educit. Aristoteles vero velut unius est speciei planta procerior, sic et Plato, et alii deinceps. At confutationes particulares requiris. Næ illud peccatum fuerit largiter in humani generis *fortunam auream*, pignus imperii, si ego ad umbrarum fugacissimarum insecutionem deflecterem. Unum (fili) in medio ponendum est veritatis lumen clarum et radiosum, quod omnia collustret, et errores universos momento dispellat. Non infirmi quidam et pallidi lychni ad singulos errorum et mendaciorum angulos et sinus circumferendi sunt. Quare quod petebas detestare (fili), nam profanum est valde. Subinde vero interrogantem te audio: num quæ isti universi asseruerunt, omnia prorsus vana et falsa fuere? Atqui (fili) infelicitatem jam narras, eamque prodigiosam non ignorantiam. Nemo enim non quandoque in aliquod verum impingitur. Heraclitum, cum scientiam ab hominibus in mundis privatis, non in mundo communi, quæsitam diceret, bene in philosophiæ introitu litasse video.[1] Democritum, cum naturæ immensam varietatem et infinitam successionem tribuens, se e regione sisteret cæterorum fere philosophorum, *secularitatibus* deditissimorum, et mancipiorum consuetudinis, et hac oppositione utrumque mendacium in se collidendo perderet, et veritati inter extrema viam quandam aperiret, non infeliciter philosophatum esse reputo. Pythagoræ numeros etiam boni ominis loco pono. Dindamum Indum quod morem Antiphysin dixerit, laudo.[2] Quin et Epicurum adversus causarum (ut loquuntur) per intentiones et fines explicationem disputantem, licet pueriliter et philologe, tamen non invitus audio. Etiam Pyrrhonem et Academicos vacillantes, et e lintre loquentes, et erga idola se gerentes veluti amatores quosdam morosos (qui amasios suos semper probris afficiunt, nunquam deserunt), animi et hilaritatis gratia adhibeo. Nec immerito; cæteros enim idola prorsum agunt, hos vero in

[1] Vol. I. p. 831. note 4.

[2] Vol. I. p. 460. note 2.

orbem; quod jocosius est. Denique Paracelsum et Severinum cum tantis clamoribus homines ad experientiæ suggestum convocant, præcones mihi exopto.[1] Quid igitur? Num veritatis compotes isti? Nihilo minus. Et rusticorum (fili) proverbia nonnulla apposite ad veritatem dicuntur. Sus rostro si forte humi A literam impresserit, num propterea suspicabere integram tragœdiam, veluti literam unam, ab ea posse describi? Longe alia est ratio (fili) veritatis quæ est ex scientiæ analogia, alia quæ ex idoli sectione enuntiatur.[2] Illa constans et quota gemina, hæc discors et solitaria. Quod etiam in operibus fit. Pulvis tormentorum si ductu, non casu (ut loquuntur) et impactu inventum fuisset, non solitarium, sed cum multa inventorum nobilium (quæ sub eundem meridianum cadunt) frequentia prodiisset. Sic et alia, tum opera tum posita. Quare moneo, si forte idolum aliquod alicujus istorum meam (id est, rerum) veritatem aliquo in puncto secuerit, noli aut de iis majora, aut de me inferiora cogitare, cum satis appareat ex reliquorum ignoratione ipsa illa, non ex scientiæ analogia, eos dixisse. Adhuc instas (fili) num ergo universas istorum chartas thuri et odoribus amicula fieri jubeo[3]? Non illud dixerim. Manet enim paulisper aliquis eorum usus, tenuis quidem et angustus, et longe alius quam in quem destinatæ erant ac nunc usurpantur, sed tamen aliquis. Adde et alias multas chartas illis celebritate obscuriores, usu præstantiores esse. Aristotelis et Platonis moralia plerique mirantur; sed Tacitus magis vivas morum observationes spirat. Verum quæ tandem utilitas ex chartis capi possit, quæque aliæ aliis utilitate antecedant, quæque minima pars sint chartarum munera, eorum quæ ad interpretationem naturæ conferunt, suo loco dicetur. Postremo (fili) ita te quærentem audio: num tu te in istorum omnium locum sufficis? Respondebo, atque id [non] dissimulanter, et ex intimo sensu meo. Ego (fili suavissime) tibi sanctum, castum, et legitimum connubium cum rebus ipsis

[1] To this somewhat short list of things which he could commend, Bacon might have added the motto which a Chinese philosopher put up in his library — "Fei, Fei:" "Reject what is false;" by which he meant to imply that the rejection of what is false is a better road to knowledge than "She, She" — or the direct assertion of what is true; Bacon's own method being based as he often says on negation and exclusion. The name of this Chinese philosopher was Ngheou-Yang-Sieou. See Premare, Notitia Linguæ Sinicæ, p. 203.

[2] That is, I believe, "in cases in which the fantastical hypothesis, idolum, cuts in upon or intersects (secat) the truth.

[3] *jubes* in the original. — *J. S.*

firmabo. Ex qua consuetudine (supra omnia epithalamiorum vota) beatissimam prolem vere Heroum (qui infinitas humanas necessitates, omnibus gigantibus, monstris, et tyrannis exitiosiores, subacturi sunt, et rebus vestris placidam et festam securitatem et copiam conciliaturi) suscipies. Ego vero (fili) si te jamjam animo ab idolis non repurgato vertiginosis experientiæ ambagibus committerem, næ tu ducem cito desiderares. Idola autem exuere simplici præcepto meo sine rerum notitia, ne, si velles maxime, posses. In tabulis nisi priora deleveris, non alia inscripseris. In mente contra: nisi alia inscripseris, non priora deleveris. Atque ut hoc fieri posset ut *idola hospitii* exueres, tamen periculum omnino est ut ab *idolis viæ* non initiatus obruare. Nimis duci assuevisti. Etiam Romæ, firmata semel tyrannide, semper postea sacramentum in senatus populique Romani nomen irritum fuit. Confide (fili), et da te mihi, ut te tibi reddam.

PARTIS INSTAURATIONIS SECUNDÆ

DELINEATIO ET ARGUMENTUM,

ET

REDARGUTIO PHILOSOPHIARUM.

PREFACE

TO THE

PARTIS INSTAURATIONIS SECUNDÆ DELINEATIO ET ARGUMENTUM.

Among the pieces collected by Gruter under the title *Impetus Philosophici*, the first is entitled *Indicia vera de Interpretatione Naturæ*. It consists of the preface to the *Novum Organum* (*Qui de naturâ tanquam de re exploratâ &c.*) which has already been printed Vol. I. p. 115.; the *Partis secundæ delineatio et Argumentum;* and a small portion of the *Redargutio Philosophiarum;* all three printed consecutively under the same general heading, as if they had been found together in the original manuscript and formed one composition. The last (which has no separate heading, but is printed as if it were a part of the *Delineatio*) breaks off abruptly. But a manuscript discovered by Robert Stephens among Lord Oxford's collections, and now in the British Museum[1], enables us to complete it, and supplies the title. That it is the same writing there can be no doubt; for the first three or four pages of the manuscript are identical, or nearly so, with the last three or four printed by Gruter, and the whole fits perfectly into its place.

The *Delineatio* is a sketch of the plan of the *Novum Organum*, as then designed; and is interesting for three reasons. First, it contains the earliest intimation of the entire scheme of the *Instauratio Magna;* which Bacon had already resolved to distribute into six parts: the second to treat of the art of interpretation; the third, fourth, and sixth to exhibit the results of the art applied; and the fifth to be provisional, consisting of *anticipations* arrived at by the ordinary method, which were afterwards to be verified by the true method. All which agrees exactly with the design ultimately developed in the *Distributio Operis*. Of the first part he says nothing; perhaps because,

[1] Harl. MSS. 6855.

though he had determined to introduce into it the substance of the *Advancement of Learning*, he had not yet settled the form; and this again agrees very well with my conjecture as to the history of the *De Augmentis*. Secondly, it marks a stage in the development of Bacon's philosophical theory: by comparing it with the *Valerius Terminus*, the *Cogitata et Visa*, and the *Novum Organum*, we learn something as to the changes which his design underwent as he worked it out (see Mr. Ellis's General Preface, Vol. I. p. 39., and Preface to *Novum Organum*, p. 79.). Thirdly, though it was afterwards superseded by that portion of the *Distributio Operis* which describes the contents of the second part of the *Instauratio*, it is in some places more full and particular, and the description of the *Ministratio ad Rationem* adds something to what we otherwise know concerning those parts of the inductive process which were to have been developed in the third book of the *Novum Organum*.

As to the time when it was composed, Mr. Ellis has shown in his preface to the *Novum Organum* that it must have been written before the *Cogitata et Visa*, and as there can be no doubt that it was written after the *Advancement of Learning* and the *Valerius Terminus*, it may be referred with tolerable confidence to the year 1606 or 1607.

According to the plan sketched out in it, the work was to begin with an attempt to clear the mind from impressions derived from the philosophical theories then extant and received; and with this accordingly, the sketch of the plan being completed, the work itself begins. The *Redargutio Philosophiarum* which follows may in fact be considered as the first chapter of the second part of the *Instauratio*, as it was then designed. I therefore print them together. I would not however be understood to imply thereby that they were composed at the same time. The arguments which convince Mr. Ellis that the *Delineatio* was written before the *Cogitata et Visa* apply to the *Delineatio* only. The *Redargutio*, like the second chapter of the *Temporis Partus Masculus*, may have been composed at a much later period than the work of which it was nevertheless meant to form a part; and while the internal evidence proves almost conclusively that that second chapter was an earlier form of the *Redargutio* than this, there is a piece of external evidence which strongly inclines me to think that the idea out of which they both grew occurred to Bacon about the same time.

In my general preface to the third part of the Philosophical works I have spoken of the difficulty which Bacon found or apprehended about this time in obtaining an audience for his views, and the various devices which he resorted to for the purpose of overcoming or avoiding them. In my preface to the *Temporis Partus Masculus* I have endeavoured to account for the tone of arroganee assumed in the second chapter, by supposing it to have been an experiment of that kind; and I have quoted two entries from the *Commentarius Solutus*, as suggesting a possible and I think not improbable explanation of it. I shall now quote, in connexion with this much improved edition of the same argument, the entire page in which one of those entries occurs. The date is July 26, 1608; and the notes run thus:

"Ordinary discourse of plus ultra in sciences, as well the intellectual globe as the material, illustrated by discovery in our age.

"Discoursing scornfully of the philosophy of the Grecians, with some better respect to the Ægyptians, Persians, Caldees, and the utmost antiquity, and the mysteries of the poets.

"Comparing the ease with that which Livy sayeth of Alexander, Nil aliud quam bene ausus vana contemnere.

"Qu. of an oration ad filios; delightful, sublime, and mixed with elegancy, affection, novelty of conceit and yet sensible, and superstition.

"To consider what opinions are fit to nourish tanquam ansæ, and so to grift the new upon the old, ut religiones solent.

"Ordinary course of incompetency of reason for natural philosophy and invention of works, a pretty device to buy and sell with: Aditus non nisi sub persona infantis."

Now if the tenor of these notes, especially the fourth, be compared with the noble oration supposed to be addressed to the assembled sages of Paris in the *Redargutio Philosophiarum*, the connexion will appear close enough, I think, to justify us in concluding that it was composed after July 1608; and this would accord very well with M. Bouillet's conjecture that this was the manuscript sent by Bacon to Tobie Matthew in a letter dated October 10, 1609, and alluded to in the following passage: "I send you at this time the only part which hath any harshness. And yet I framed to myself an opinion that whosoever allowed well of that preface which you so much commend,

will not dislike, or at least ought not to dislike, this other speech of preparation. For it is written out of the same spirit and out of the same necessity. Nay it doth more fully lay open that the question between me and the ancients is not of the virtue of the race, but of the rightness of the way. And to speak truth, it is to the other but as *palma* to *pugnus* — part of the same thing, more large."

Of the matter of the oration it is not necessary to say anything, since it is all to be found either in the prefaces to the *Novum Organum*, or in the aphorisms of the first book. The form is peculiar to this composition, which exhibits as perfect a specimen as we have of Bacon's power as an artist and an orator.

I have taken the text from the manuscript (which has been revised and corrected throughout by Bacon himself, and some sentences added between the lines or in the margin), except in the part which has been printed by Gruter, and which appears to have been taken from a corrected copy. For as I find that all the alterations made by Bacon in the manuscript, with only one exception, are contained in Gruter's copy, I infer that the differences between the two are due to further alterations made subsequently, and that the manuscript which Gruter had was the beginning of a fair transcript of later date. I have however given the readings of the Harleian manuscript in the notes: so that on this point the reader may judge for himself.

J. S.

PARTIS INSTAURATIONIS SECUNDÆ

DELINEATIO ET ARGUMENTUM.

Memores autem instituti nostri, omnia perspicue proponemus, atque ordine non perturbato. Pateat itaque hujus partis destinatio et distributio. Destinatur huic parti doctrina de meliore ac perfectiore usu rationis quam hucusque hominibus sit cognitus aut monstratus; eo consilio, ut per hoc intellectus humanus (quantum conditio mortalitatis recipit) exaltetur, et facultate amplificetur ad naturæ obscuritatem vincendam et interpretandam. Namque ipsi Interpretationi Naturæ attribuuntur libri tres; tertius, quartus, et sextus; siquidem quintus, qui ex Anticipationibus est secundum usum rationis communem, ad tempus tantum sumitur, et deinceps, postquam figi cœperit atque ex usu rationis legitimo verificari, et transfertur et commigrat in sextum. Huic vero libro secundo committitur Intellectus ipse ejusque cura et regimen, omnisque apparatus atque instructio ad veram rationis administrationem conducens describitur. Atque licet nomen ipsum Logicæ, sive Dialecticæ, propter depravationes apud nos ingratum fere sonet, tamen ut homines per consueta tanquam manu ducamus, est certe ars ea quam adducimus ex genere Logicæ, quæ et ipsa (vulgaris inquam) auxilia et præsidia intellectui parat et molitur. Differt autem nostra a Logica vulgari, tum aliis rebus, tum præcipue tribus; videlicet initiis inquirendi, ordine demonstrandi, atque fine et officio. Nam et inquisitionis initium altius sumit, ea subjiciendo examini quæ logica vulgaris veluti ex fide aliena et authoritate cæca recipit; principia, notiones primas, atque ipsas informationes sensus; et ordinem demonstrandi plane invertit, propositiones et axiomata ab historia et particularibus ad generalia per scalam adscensoriam continenter subvehendo

et excitando; non protinus ad principia et magis generalia advolando, atque ab illis medias propositiones deducendo et derivando. Finis autem hujus scientiæ est, ut Res et Opera, non argumenta et rationes probabiles, inveniantur et judicentur. Quare institutum hujus libri secundi hujusmodi est. Nunc distributionem ejusdem similiter proponemus. Quemadmodum in generatione luminis requiritur, ut corpus lumen recepturum poliatur, atque deinde in debito ad lucem situ sive conversione ponatur, antequam lucis ipsius fiat immissio; prorsus ita est operandum. Primo enim mentis area æquanda, et liberanda ab eis quæ hactenus recepta sunt; tum conversio mentis bona et congrua facienda est ad ea quæ afferuntur; postremo menti præparatæ informatio exhibenda. Atque pars destruens triplex est, secundum triplicem naturam idolorum quæ mentem obsident. Illa enim aut adscititia sunt, idque dupliciter, nimirum quæ immigrarunt in mentem eamque occuparunt, vel ex philosophorum placitis atque sectis, vel rursus ex perversis legibus et rationibus demonstrationum; aut ea quæ menti ipsi et substantiæ ejus inhærentia sunt atque innata. Sicut enim speculum inæquale veros rerum radios ex sectione propria immutat: ita et mens, quando a rebus per sensum patitur, in motibus suis expediendis, haudquaquam optima fide, rerum naturæ suam naturam inserit et immiscet. Itaque primus imponitur labor, ut omnis ista militia Theoriarum, quæ tantas dedit pugnas, mittatur ac relegetur. Accedit labor secundus, ut mens a pravis demonstrationum vinculis solvatur. Hunc excipit tertius, ut vis ista mentis seductoria coërceatur, atque idola innata vel evellantur, vel, si evelli non possint, ita tamen indicentur atque pernoscantur ut variationes restitui possint. Inutilis enim et fortasse damnosa fuerit errorum in philosophiis demolitio et destructio, si ex prava complexione mentis novi errorum surculi, et fortasse magis degeneres, pullulaverint; neque prius absistendum, quam omnis spes præcidatur ex usu rationis communi aut ex vulgaris logicæ præsidiis et auxiliis philosophiæ absolvendæ aut majorem in modum amplificandæ; ne forte errores non abjiciamus sed permutemus. Itaque pars ista, quam destruentem appellamus, tribus redargutionibus absolvitur; Redargutione Philosophiarum; Redargutione Demonstrationum; et Redargutione Rationis Humanæ Nativæ. Neque nos fugit, absque tanto motu accessiones non parvas ad scientias a nobis fieri potuisse, atque aditu fortasse ad laudem

molliore. Verum nos nescii quando hæc alicui alii in mentem ventura sint, fidem nostram in integrum liberare decrevimus. Post aream mentis æquatam, sequitur ut mens ponatur in conversione bona et veluti in adspectu benevolo ad ea quæ proponemus. Cum enim in re nova valeat ad præjudicium, non solum præoccupatio fortis opinionis veteris, verum etiam præceptio sive præfiguratio falsa rei quæ affertur, etiam huic malo remedium adhibendum est atque mens non tantum vindicanda sed et præparanda. Ea præparatio nihil aliud est quam ut veræ habeantur de eo quod adducimus opiniones, ad tempus tantummodo, et tanquam usurariæ, donec res ipsa pernoscatur. Atque hoc in eo fere situm est, ut pravæ et sinistræ suspiciones, quales ex prænotionibus receptis (veluti ex atra bile quadam epidemica) mentes hominum subituras facile conjicimus, arceantur atque intercipiantur; quod ait ille,

ne qua
Occurrat facies inimica, atque omina turbet.

Primo igitur si quis ita cogitet, occulta naturæ veluti signo divino clausa manere, atque ab humana sapientia interdicto quodam separari, dabimus operam ut hæc opinio infirma atque invida tollatur, eoque rem perducemus, simplici veritate freti, ut non solum ne qua oblatret superstitio, verum etiam ut religio in partes nobis accedat. Rursus si cui hujusmodi quippiam in mentem veniat opinari, magnam illam et solicitam moram in experientia et in materiæ et rerum particularium undis quam hominibus imponimus, mentem veluti in Tartarum quendam confusionis dejicere, atque ab abstractæ sapientiæ serenitate et tranquillitate, ut a statu multo diviniore, submovere; docebimus, atque in perpetuum, ut speramus, stabiliemus (non sine rubore, ut existimamus, omnis scholæ quæ meditationibus inanibus atque ab omni essentia desertissimis apotheosin quandam attribuere non veretur), quantum inter divinæ mentis ideas et humanæ mentis idola intersit. Quinetiam illis quibus in contemplationis amorem effusis frequens apud nos operum mentio asperum quiddam atque ingratum et mechanicum sonat, monstrabimus quantum illi desideriis suis propriis adversentur; cum puritas contemplationum atque substructio et inventio operum prorsus eisdem rebus nitantur, ac simul perficiantur. Adhuc si quis hæsitet, atque istam scientiarum ab integro regenerationem ut rem sine exitu et vastam et quasi infinitam accipiat,

ostendemus eam contra censeri debere potius errorum et vastitatis terminum et verum finitorem; atque planum faciemus, inquisitionem rerum particularium justam et plenam, demptis individuis et gradibus rerum et variationibus minutis (id quod ad scientias satis est), atque inde debito modo excitatas notiones sive ideas, rem esse multis modis magis finitam et habilem et comprehensibilem et sui certam, et de eo quod confectum est atque eo quod superest gnaram, quam speculationes et meditationes abstractas, quarum revera nullus est finis, sed perpetua circulatio, volutatio, et trepidatio. Atque etiamsi quis sobrius (ut sibi videri possit), et civilis prudentiæ diffidentiam ad hæc transferens, existimet hæc quæ dicimus votis similia videri, quæque spei nimis indulgeant; revera autem ex philosophiæ statu mutato nil aliud secuturum quam ut placita fortasse transferantur, res autem humanæ nihilo futuræ sint auctiores; huic fidem, ut putamus, faciemus, nil minus agi quam placitum aut sectam; nostramque rationem ab iis quæ hucusque in philosophia et scientiis præbita sunt toto genere differre; operum autem certissimam messem sponderi, ni homines muscum sive segetem herbidam demetere præoccuparint, atque affectu puerili et conatu fallaci operum pignora intempestive captaverint. Atque ex his quæ diximus pertractatis, satis cautum de præjudicio fore existimamus illius generis quod ex prava et iniqua rei quæ adducitur perceptione conflatur, atque una secundam partem, quam præparantem appellamus, absolvi; postquam et ex parte religionis, et ex parte contemplationis abstractæ, et ex parte prudentiæ naturalis, atque ejus comitatu, diffidentia et sobrietate et similibus, omnis adversa aura conticuerit et reflare desierit. Attamen ut omnibus numeris completa adhibeatur præparatio, illud deesse videtur, ut languor ipse mentis et torpor ex rei miraculo contractus tollatur. Hæc autem mala dispositio mentis tantum per causarum indicationem aufertur. Sola enim causarum cognitio miraculum rei et stuporem mentis solverit. Itaque omnes impedimentorum malitias et molestias quibus interclusa philosophia vera remorata est signabimus, ut minime mirum sit humanum genus erroribus tam diuturnis implicatum atque exercitum fuisse. In qua parte, etiam illud opportune ad spem solido argumento fovendam patebit, nimirum licet vera illa Naturæ Interpretatio quam molimur merito maxime difficilis, tamen multo maximam difficultatis partem in iis subesse quæ in potestate nostra sunt atque corrigi possunt,

non in iis quæ extra potestatem nostram sita existunt; in mente (inquam), non in rebus ipsis aut in sensu. Quod si cui supervacua videatur accurata ista nostra quam adhibemus ad mentes præparandas diligentia, atque cogitet hoc quiddam esse ex pompa et in ostentationem compositum, itaque cupiat rem ipsam, missis ambagibus et præstructionibus, simpliciter exhiberi; certe optabilis nobis foret (si vera esset) hujusmodi insimulatio. Utinam enim tam proclive nobis esset difficultates et impedimenta vincere, quam fastum inanem et falsum apparatum deponere. Verum hoc velimus homines existiment, nos haud inexplorato viam in tanta solitudine inire, præsertim cum argumentum hujusmodi præ manibus habeamus, quod tractandi imperitia perdere et veluti exponere nefas sit. Itaque ex perpenso et perspecto tam rerum quam animorum statu, duriores fere aditus ad hominum mentes quam ad res ipsas invenimus, ac tradendi labores inveniendi laboribus haud multo leviores experimur, atque, quod in intellectualibus res nova fere est, morem gerimus, et tam nostras cogitationes quam aliorum simul bajulamus. Omne enim idolum vanum arte atque obsequio ac debito accessu subvertitur; vi et contentione atque incursione subita et abrupta efferatur. Neque hoc ideo tantum fit, quod homines vel admiratione authorum captivi, vel propria fiducia tumidi, vel assuetudine quadam renitentes, se æquos præbere nolint. Si quis libentissime sibi æquitatem imperare voluerit atque omne præjudicium veluti ejuraverit, tamen et tali mentis dispositioni neutiquam propterea fidere oporteret. Nemo enim intellectui suo ex arbitrio voluntatis suæ imperat, neque philosophorum (ut prophetarum) spiritus philosophis subjecti sunt. Itaque non aliorum æquitas aut sinceritas aut facilitas, sed nostra propria cura atque morigeratio et insinuatio nobis præsidio esse possit. Qua in re accedit et alia quædam difficultas ex moribus nostris haud parva, quod constantissimo decreto nobis ipsi sancivimus, ut candorem nostrum et simplicitatem perpetuo retineamus, nec per vana ad vera aditum quæramus, sed ita obsequio nostro moderemur, ut tamen non per artificium aliquod vafrum aut imposturam aut aliquid simile impostura, sed tantummodo per ordinis lumen et per novorum super saniorem partem veterum solertem insitionem, nos nostrorum votorum compotes fore speremus. Itaque eo redimus, ut hanc præmuniendi diligentiam minorem potius pro tantis difficultatibus, quam minus necessa-

riam esse judicemus. Missa autem jam parte præparante, ad partem informantem veniemus, atque artis ipsius quam adducimus figuram simplicem et nudam proponemus. Quæ ad intellectum perficiendum ad Interpretationem Naturæ faciunt, dividuntur in tres ministrationes; ministrationem ad Sensum, ministrationem ad Memoriam, et ministrationem ad Rationem. In ministratione ad Sensum tria docebimus. Primo, quomodo bona notio constituatur et eliciatur, ac quomodo testatio sensus, quæ semper est ex analogia hominis, ad analogiam mundi reducatur et rectificetur; neque enim multum sensui tribuimus in perceptione immediata, sed quatenus motum sive alterationem rei manifestat. Secundo, quomodo ea quæ sensum effugiunt, aut subtilitate totius corporis, aut partium minutiis, aut loci distantia, aut tarditate vel etiam velocitate motus, aut familiaritate objecti, aut alias, in ordinem sensus redigantur, atque ejus judicio sistantur; ac insuper in casu quo adduci non possunt, quid faciendum, atque quomodo huic destitutioni vel per instrumenta vel per graduum observationem peritam vel per corporum proportionatorum ex sensibilibus ad insensibilia indicationes vel per alias vias ac substitutiones, sit subveniendum. Postremo loco de historia naturali, et de modo experimentandi dicemus, qualis sit ea historia naturalis quæ ad philosophiam condendam sufficere possit; et rursus qualis experimentatio deficiente historia necessario sit suscipienda: ubi etiam quædam de provocanda et figenda attentione admiscebimus. Multa enim in historia naturali atque experimentis, notitia ipsa adesse jampridem, usu abesse solent, propter vim animi apprehensivam minime excitatam. His tribus ministratio ad sensum absolvitur. Aut enim sensui materia præbetur, aut juvamentum; nimirum vel ubi deficit, vel ubi declinat. Materiæ, historia et experimenta; defectui sensus, substitutiones; declinationi, rectificationes debentur. Ministratio ad Memoriam hoc officium præstat, ut ex turba rerum particularium et naturalis historiæ generalis acervo particularis historia excerpatur, atque disponatur eo ordine ut judicium in eam agere et opus suum exercere possit. Etenim vires mentis sobrie æstimandæ, neque sperandum et eæ in rerum infinitate discurrere possint. Manifestum autem est, memoriam tum in rerum multitudine comprehendenda incapacem et incompetentem, tum in rerum delectu quæ ad inquisitionem aliquam definitam faciant suggerendo, imparatam

atque inhabilem esse. Quod autem ad prius malum attinet, facilis est medendi ratio; unico enim remedio absolvitur; ut nulla nisi de scripto inquisitio aut inventio recipiatur. Perinde enim est ut quis Interpretationem Naturæ in aliquo subjecto memoria sola nixus complecti velit, ac si computationes ephemeridis memoriter tenere aut perficere tentet. Quinetiam satis liquet quantum memoriæ et mentis discursui tribuamus, cum nec de scripto inventionem, nisi per tabulas ordinatas, probemus. De posteriore igitur magis laborandum. Atque certe postquam subjectum inquisitioni constitutum et terminatum sit atque a corpore rerum abscissum et inconfusum constiterit (in quo habemus nonnulla quæ utiliter præcipiamus), ministratio ista ad memoriam tribus operis sive officiis constare videtur. Primo, docebimus qualia sint ea quæ circa subjectum datum sive propositum (discurrendo per historiam) inquiri debeant, quod est instar Topicæ. Secundo, quo ordine illa disponi oporteat, et in tabulas digeri. Neque tamen ullo modo speramus veram rei venam quæ ex analogia universi sit, jam a principio inveniri posse, ut eam partitio sequatur; sed tantum apparentem, ut res aliquo modo secetur in partes. Citius enim emerget veritas e falsitate quam e confusione, et facilius ratio corriget partitionem quam penetrabit massam. Tertio itaque ostendemus, quo modo et quo tempore inquisitio sit reintegranda, et chartæ sive tabulæ præcedentes in chartas novellas transportandæ, et quoties inquisitio sit repetenda. Etenim primas chartarum series vel sequelas super polos mobiles verti statuimus, et tantum probationes esse et tentamenta inquisitionis; siquidem mentem in naturam rerum jus suum persequi et obtinere posse, nisi repetita actione, plane diffidimus. Itaque ministratio ad memoriam tribus (ut diximus) doctrinis absolvitur; de locis inveniendi, de methodo contabulandi, et de modo instaurandi inquisitionem. Superest ministratio ad Rationem, cui ministrationes duæ priores subministrant. Nullum enim per eas constituitur axioma, sed tantum notio simplex cum historia ordinata; certo verificata per ministrationem primam, atque ita repræsentata per secundam, ut tanquam in potestate nostra sit. Atque ministratio ad rationem ea maxime probari meretur, quæ rationem ad opus suum exequendum et finem obtinendum optime juvabit. Opus autem rationis natura unicum; fine et usu geminum est. Aut enim *scire et contemplari*, aut *agere et efficere*, homini pro fine

est. Itaque aut causæ expetitur cognitio et contemplatio; aut effecti potestas et copia. Quamobrem dati effectus vel naturæ in quovis subjecto causas nosse, intentio est humanæ scientiæ. Atque rursus, super datam materiæ basin effectum quodvis sive naturam (inter terminos possibilis) imponere vel superinducere, intentio est humanæ potentiæ[1]. Atque hæ intentiones, acutius inspicienti et vere æstimanti, in idem coincidunt. Nam quod in contemplatione instar causæ est, in operatione est instar medii; scimus enim per causas, operamur per media. Et certe si media universa quæ ad opera quælibet requiruntur homini optato ad manum suppeterent, nil opus foret magnopere ista separatim tractare. Verum cum operatio humana in multo majores angustias compellatur quam scientia, propter individui multiplices necessitates et inopias; adeo ut ad partem operativam requiratur sæpius non tam sapientia universalis et libera de eo quod fieri potest, quam prudentia sagax et solers ad delectum eorum quæ præsto sunt; ista tractatu felicius disjungi consentaneum est. Quare et ministrationis eandem partitionem faciemus, ut aut parti contemplativæ aut activæ ministretur. Atque quod ad partem contemplativam attinet, ut verbo dicamus, in uno plane sunt omnia. Hoc ipsum non aliud est, quam ut verum constituatur axioma, sive idea[2] copulata; hæc enim est veritatis portio solida, cum simplex notio instar superficiei videri possit. Hoc autem axioma non elicitur aut efformatur, nisi per inductionis formam legitimam et propriam; quæ experientiam solvat et separet, atque per exclusiones et rejectiones debitas necessario concludat. Vulgaris autem inductio (a qua tamen principiorum ipsorum probationes petuntur) puerile quiddam est, et precario concludit, periculo ab instantia contradictoria exposita; adeo ut dialectici de ea nec serio cogitasse videantur, fastidientes et ad alia properantes. Illud interim manifestum est, quæ per inductionem cujusvis generis concluduntur, simul et inveniri et judicari, nec a principiis aut mediis pendere, sed mole stare sua, neque aliunde probari. Multo magis necesse est ea quæ ex vera inductionis forma excitantur axiomata, esse

[1] *præsentiæ* in Gruter.

[2] Gruter's copy has *idem copulata*; obviously a misprint; which Blackbourn attempted to correct by silently substituting *copulatum*; a reading in which all subsequent editors have acquiesced, including M. Bouillet. I cannot doubt however that the error was in *idem*, and that the reading which I have introduced into the text is the true one.

seipsis contenta, atque ipsis principiis, quæ vocantur, certiora et firmiora. Atque hoc genus inductionis illud est, quod interpretationis formulam appellare consuevimus. Itaque præ omnibus doctrinam de constitutione axiomatis et formula interpretandi diligenter et perspicue complectimur. Restant tamen quæ huic rei serviunt tria maximi omnino momenti, sine quorum explicatione inquisitionis istius præscriptum, licet potestate validum, tamen usu operosum censeri possit. Ea sunt, inquisitionis ipsius continuatio, variatio, et contractio; ut nihil in arte aut abruptum, aut incongruum, aut pro humanæ vitæ brevitate longum relinquatur. Docebimus itaque primo usum axiomatum (jam per formulam inventorum) ad alia axiomata inquirenda et excitanda, quæ superiora et magis generalia sint: ut per veros et nusquam intermissos gradus scalæ adscensoriæ ad unitatem naturæ perveniatur. In quo tamen adjiciemus modum eadem axiomata superiora per experientias primas examinandi et verificandi, ne rursus ad conjecturas et probabilia atque idola prolabamur. Atque hæc est ea doctrina, quam inquisitionis continuationem appellamus. Variatio autem inquisitionis sequitur naturam diversam, aut causarum quarum gratia inquisitio instituitur, aut rerum ipsarum sive subjectorum in quibus inquisitio versatur. Itaque missis causis finalibus, quæ naturalem philosophiam prorsus corruperunt, initia sumemus ab inquisitione variata sive accommodata formarum; quæ res pro desperata hucusque abjecta est, idque merito. Neque enim ulli obvenire possit tanta facultas aut felicitas, ut ex anticipationibus et dialecticis argumentationibus alicujus rei formam eruat. Sequentur inquisitiones materiarum et efficientium. Cum autem efficientia et materias dicimus, non efficientia remota aut materias communes (qualia in disputationibus agitantur), sed efficientia propiora et materias præparatas intelligimus. Id ne sæpius subtilitate inutili repetatur, inventionem latentis processus subtexemus. Latentem autem processum appellamus seriem et ordinem mutationis; rem scilicet ex efficientis motu et materiæ fluxu conflatam. Quæ autem secundum subjecta fit inquisitionis variatio, ex duabus rerum conditionibus ortum habet; aut ex natura simplicis et compositi (alia enim accommodatur inquisitio ad res simplices, alia ad compositas et decompositas et perplexas), aut ex historiæ copia et inopia, quæ ad inquisitionem peragendam parari possit. Ubi enim historia abundat, expedita est ratio inquisitionis; ubi tenuis est, in arcto

est labor, et multifaria industria et arte opus habet. Itaque per ista quæ jam dicta sunt tractata, variationem inquisitionis absolvi putamus. Restat inquisitionis contractio, ut non tantum in inviis via, sed et in viis compendium, et tanquam linea recta quæ per ambages et flexus secet, ex indiciis nostris innotescat. Hoc autem (veluti et omnis ratio compendiaria) maxime in rerum delectu consistit. Duas autem invenimus veluti rerum prærogativas, quæ ad inquisitionis compendia plurimum faciunt; Prærogativam Instantiæ, et Prærogativam Inquisiti. Itaque docebimus primo quales sint illæ instantiæ, sive experimenta, quæ ad illuminationem præ cæteris excellant, adeo ut paucæ idem quod aliæ plures præstent. Hoc enim et moli ipsius historiæ, et discurrendi laboribus parcit. Deinde etiam explicabimus qualia sint ea inquisita, a quibus interpretationem auspicari oporteat, utpote quæ prædisposita sequentibus facem quandam præferunt, aut ob exquisitam certitudinem in se, aut ob naturam universalem, aut ob necessitatem ad probationes mechanicas. Atque hic ministrationi quæ ad contemplativam partem spectat, finem imponimus. Activam autem partem ac ejus ministrationem triplici doctrina claudemus, si prius duo monita ad aperiendas hominum mentes præmittamus. Horum primum est, in inquisitione ea quæ fit per formulam, inter contemplativam partem activam ipsam perpetuo intercurrere. Hoc enim fert rerum natura, ut propositiones et axiomata a magis generalibus per argumentationem dialecticam deducta et derivata, ad particularia et opera obscure admodum et incerto innuant. Quod autem ex particularibus axioma educitur, ad nova particularia tanquam correspondentia manifesto et constanti tramite ducat. Alterum hujusmodi est, ut meminerint homines, in inquisitione activa necesse esse rem per scalam descensoriam (cujus usum in contemplativa sustulimus) confici. Omnis enim operatio in individuis versatur, quæ infimo loco sunt. Itaque a generalibus per gradus ad ea descendendum est. Neque rursus fieri potest, ut per axiomata simplicia ad ea perveniatur; omne enim opus atque ejus ratio ex coitione axiomatum diversorum instituitur et designatur. Itaque hæc præfati, ad triplicem illam doctrinam activam veniemus; quarum prima proponit modum inquisitionis distinctum et proprium, ubi non jam causa aut axioma, sed operis alicujus effectio, ex intentione est atque inquisitioni subjicitur. Secunda ostendit modum conficiendi tabulas practicas generales, per quas omnigenæ operum designationes facilius et

promptius deducantur. Tertia subjungit modum quendam inquirendi sive inveniendi opera, imperfectum certe, sed tamen non inutilem, quo ab experimento ad experimentum procedatur absque constitutione axiomatis. Nam quemadmodum ab axiomate ad axioma, ita etiam ab experimento ad experimentum datur et aperitur quædam via ad inveniendum instabilis et lubrica, sed tamen non prorsus silentio prætermittenda. Jam igitur et practicam ministrationem quoque, quæ in distributione ultima posita est, absolvimus. Atque hæc est hujusce secundi libri aperta et brevis delineatio. Quibus explicatis, Thalamum nos Mentis Humanæ et Universi, pronuba divina bonitate, plane constituisse confidimus. Epithalamii autem votum sit, ut ex eo connubio auxilia humana, tanquam stirps heroum, quæ necessitates et miserias hominum aliqua ex parte debellent et dooment, suscipiatur et deducatur. Sub finem tamen quædam de laborum consociatione et successione subjiciemus. Tunc enim demum homines vires suas noscent, cum non eadem infiniti, sed omissa alii præstabunt. Neque sane de futuris ætatibus spem abjecimus, quin exoriantur qui ista a tenuibus profecta initiis in majus provehant. Illud enim occurrit, hoc quod agitur, ob boni naturam eminentem, manifeste a Deo esse. In divinis autem operibus minima quæque principia eventum trahunt.[1]

REDARGUTIO PHILOSOPHIARUM.

Atque in redargutione ipsa philosophiarum quam paramus, nescimus fere quo nos vertamus, cum via quæ aliis in confutationibus patuit nobis interclusa sit. Nam et tot et tanta se ostendunt errorum agmina, ut ea non strictim sed confertim evertere et summovere necesse sit; et si propius accedere et cum singulis manum conserere velimus, id frustra fuerit; sublata disputationis lege, cum de principiis non consentiamus; et multo magis, quod ipsas probationum et demonstrationum formas et potestates rejiciamus. Quod si (id quod solum relinqui videtur) ea quæ nos asserimus a sensu ipso et experientia educere et excitare connitamur, rursus eodem revolvimur; et

[1] Here the Delineation ends, and the work itself begins, with the first part of the *Pars Destruens*; namely the *Redargutio Philosophiarum*. The Harleian MS. (which begins with the words *Dum hæc tractarem*, at the bottom of the next page and enables us to complete this fragment) bears that title, and this seems to be the proper place for the introduction of it; though there is no title here in the original, but only a fresh paragraph.

obliti eorum quæ de animorum præparatione dicta sunt, contrariam ingressi viam inveniamur; nam in res ipsas abrupte et directo incidamus, ad quas viam quandam aperiri et substerni, propter obfirmatas animorum præoccupationes et obsessiones, necesse esse decrevimus. Sed tamen propterea ipsi nos minime deseremus; sed aliquid comminisci et tentare quod proposito nostro consentaneum sit conabimur; tum signa quædam adducentes, ex quibus de philosophiis judicium fieri possit; tum interim inter ipsas philosophias, portenta errorum nonnulla, et mera animorum ludibria, ad earum authoritatem labefactandam notantes. Neque tamen nos fugit, fortius hujusmodi errorum æra[1] figi, quam ut eis per satyram derogetur; præsertim cum viris doctis non sit nova aut incognita ea confidentiæ et jactantiæ species, quæ opiniones abjicit, non frangit. Sed nec nos aliquid levius aut inferius quam pro rei quæ agitur majestate afferemus, neque ex hoc genere redargutionis prorsus fidem facere, sed tantum patientiam et æquanimitatem, idque in ingeniis tantum altioribus et firmioribus, conciliare speramus. Neque enim quispiam ex isto assiduo et perpetuo errorum contubernio ita se recipere potest, et ad nostra cum tanta benevolentia et animi magnitudine accedere, ut non cupiat habere interim quæ de veteribus et receptis cogitet et opinetur. Sane in tabellis non alia inscripseris, nisi priora deleveris; in mente ægre priora deleveris, nisi alia inscripseris.

Itaque huic desiderio subveniendum putavimus, atque hæc prorsus eo spectant (ut quod res est aperte eloquamur) ut volentes ducant, non ut nolentes trahant. Omnem violentiam (ut jam ab initio professi sumus) abesse volumus: atque quod Borgia facete de Caroli Octavi expeditione in Italiam dixit, Gallos venisse in manibus cretam tenentes, qua diversoria notarent, non arma, quibus perrumperent; similem quoque inventorum nostrorum et rationem et successum animo præcipimus; nimirum ut potius animos hominum capaces et idoneos seponere et subire possint, quam contra sentientibus molesta sint. Verum in hac parte de qua jam loquimur, quæ ad redargutionem philosophiarum pertinet, feliciter sane levati sumus, casu quodam opportuno et mirabili. Nam[2] dum hæc tractarem, intervenit

[1] *aëra* in Gruter.

[2] Here begins the Harleian MS.: the title *Redargutio Philosophiarum* being inserted at the head of it, but in a comparatively modern hand. Whether it bore that title originally must remain doubtful, the cover (if it ever had any) being lost.

amicus meus quidam ex Gallia rediens, quem cum salutassem, atque ego illum, ille me, de rebus nostris familiariter interrogassemus: Tu vero, inquit, vacuis tuis ab occupationibus civilibus spatiis[1], aut saltem remittentibus negotiis, quid agis? Opportune, inquam; nam ne nihil[2] me agere existimes, meditor Instaurationem Philosophiæ, quæ[3] nihil inanis aut abstracti habeat, quæque vitæ humanæ conditiones in melius provehat. Honestum profecto opus, inquit: et quos socios habes? Ego certe, inquam, in summa solitudine versor.[4] Duræ inquit, partes tuæ sunt; et statim addidit; Atque tamen scito hæc aliis curæ esse. Tum ego lætatus, Animam, inquam, reddidisti.[5] Ego enim hoc animo præceperam, fœtum meum veluti in eremo periturum.[6] Vis, inquit, ut tibi narrem quæ mihi in Gallia circa hujusmodi negotium evenerunt? Libentissime, inquam, atque insuper gratiam habebo. Tum retulit se Parisiis vocatum a quodam amico suo, atque introductum in consessum virorum, qualem, inquit, vel tu videre velles; nihil[7] in vita mihi accidit jucundius. Erant autem circiter quinquaginta viri, neque ex iis quisquam adolescens, sed omnes ætate provectiores; quique vultu ipso dignitatem cum probitate singuli præ se ferrent. Inter quos aiebat se cognovisse nonnullos honoribus perfunctos, atque alios ex senatu; etiam antistites sacrorum insignes, atque ex omni fere ordine eminentiore aliquos. Erant etiam quidam, ut aiebat, peregrini ex diversis nationibus. Atque cum[8] primo introiisset, invenisse[9] eos familiariter inter se colloquentes; sedebant tamen ordine sedilibus dispositis, ac veluti adventum alicujus expectantes. Neque ita multo post ingressum ad eos virum quendam[10], aspectus (ut ei videbatur) admodum placidi et sereni; nisi quod oris compositio erat tanquam miserantis; cui cum omnes assurrexissent: Ille circumspiciens et subridens, nunquam, inquit, existimavi potuisse fieri, ut otium omnium vestrum, cum singulos recognosco, in unum

The word *spatiis* is crossed out in the MS., and *intervallis* substituted in Bacon's hand. It is the only correction which Gruter's copy does not contain.

[2] *nil* in MS.

[3] *ejusmodi quæ* in MS.

[4] *Ego certe, inquam, profecto nullos: quin nec quenquam habeo quocum familiariter de hujusmodi rebus colloqui possim, ut me saltem explicem et exacuam.* — MS.

[5] *Guttula, inquam, me aspersisti atque animam reddidisti.* — MS.

[6] *Ego enim anum quandam fatidicam non ita pridem conveni, quæ mihi nescio quid obmurmurans vaticinata est fœtum meum in solitudine periturum.* — MS.

[7] *nihil enim.* — MS.

[8] *cum ille.* — MS.

[9] *invenit.* — MS.

[10] *ingressus est ad eos vir quidam.*—MS.

atque idem tempus coinciderit; idque quomodo evenerit, satis mirari non possum. Cumque unus ex cœtu respondisset, eum ipsum hoc otium illis fecisse, cum quæ ab ipso[1] exspectarent illi ducerent omni negotio potiora: Atque (ut video) inquit, universa illa jactura ejus quod hic consumetur temporis, quo certe vos separati multis mortalibus profuissetis, ad meas rationes accedet. Quod si ita est, videndum profecto ne vos diutius morer; simul consedit, absque suggesto aut cathedra, sed ex æquo cum cæteris; atque hujusmodi quædam apud eum consessum verba fecit. Nam aiebat qui hæc narrabat, se illa tum excepisse ut potuit; licet cum apud se una cum illo amico suo, qui eum introduxerat, ea recognosceret, fateretur ea longe inferiora iis quæ tum dicta essent visa esse. Exemplum autem orationis[2], quod circa se habebat, proferebat. Illud ita scriptum erat: Vos certe, filii, homines estis: hoc est, ut ego existimo, non animantes erecti, sed Divi mortales.[3] Deus, mundi conditor et vestrum, animas vobis donavit mundi ipsius capaces; nec tamen eo ipso satiandas. Itaque fidem vestram sibi seposuit et retinuit[4], mundum sensui attribuit; neutra autem oracula clara esse voluit, sed involuta; neque queri potestis si vos exerceat[5], quandoquidem excellentiam rerum rependat.[6] Atque de rebus divinis optima de vobis spero; circa humana autem metuo vobis, ne diuturnus error vos usuceperit. Existimo enim hoc apud vos penitus credi, vos statu uti scientiarum florente et bono. Ego rursus moneo vos, ne eorum quæ habetis aut copiam aut utilitatem, quasi ad magnum aliquod fastigium evecti et votorum compotes aut laboribus perfuncti accipiatis. Idque sic considerate; si[7] omnem illam scriptorum varietatem qua scientiæ tument et luxuriantur excutiatis, et de eo quod afferunt scripta illa[8] interpelletis et stricte et presse examinetis, ubique reperietis ejusdem rei repetitiones infinitas; verbis, ordine, exemplis, atque illustratione, diversas; rerum summa et pondere ac vera potestate prælibatas ac demum fere[9] iteratas; ut in pompa paupertas sit, et in rebus jejunis fastidium. Atque si vobiscum familiariter loqui et jocari hac de re liceat, videtur

[1] So MS. Gruter's copy has *illo*.
[2] *orationis, quam exceperat.* — MS.
[3] *homines estis et mortales; nec conditionis vestræ tantum pœniteat si naturæ vestræ satis memineritis.* — MS.
[4] *et retinuit* omitted in MS.
[5] *ut vos exerceret.* — MS.
[6] *rependeret.* — MS.
[7] *in omnem.* — MS.
[8] *excutiatis et . . . scripta illa* omitted in MS.
[9] *ac plane* in MS.

doctrina vestra cœnæ illius [1] hospitis Chalcidensis simillima, qui cum interrogaretur unde tam varia venatio, respondit, illa omnia condimentis [2] ex mansueto sue esse facta. Neque enim negabitis universam istam copiam nil aliud esse quam portionem quandam philosophiæ Græcorum; eamque certe minime in saltu aut sylvis naturæ nutritam; sed in scholis et cellis, tanquam animal domesticum saginatum. Si enim [3] a Græcis iisque paucis abscedatur [4], quid tandem habent vel Romani vel Arabes vel nostri, quod non ab Aristotelis, Platonis, Hippocratis, Galeni, Euclidis [5], Ptolemæi inventis derivetur, aut in eadem recidat? Itaque videtis divitias vestras esse paucorum census; atque in sex fortasse hominum cerebellis spes et fortunas omnium sitas esse.[6] Neque vero idcirco Deus vobis animas rationales indidit, ut Authoris vestri partes [7] (fidem scilicet vestram quæ Deo et [8] divinis debetur) hominibus differretis: neque sensus informationem firmam et validam attribuit, ut paucorum hominum opera, sed ut ipsius Dei opera [9], Cœlum et Terram, contemplaremini; laudes ejus [10] celebrantes, et hymnum conditori [11] vestro canentes, iis [12] etiam viris, si placet (nihil enim obstat), in chorum receptis.[13] Quinetiam ista ipsa doctrina, usu vestra, origine Græca, quæ tanta pompa incedit, quota pars fuit illa sapientiæ Græcorum? Ea enim varia fuit; varietas autem ut veritati non acquiescit, ita nec errorem figit; sed ad veritatem est instar iridis ad solem, quæ omnium imaginum est maxime infirma et quasi deperdita, sed tamen imago. Verum et hanc quoque varietatem nobis extinxit (Græcus et ipse) Aristoteles: credo, ut discipuli res gestas æquaret. Atque discipuli præconium (si recte memini) tale celebratur:

> Felix terrarum prædo, non utile mundo
> Editus exemplum, terras tot posse sub uno
> Esse viro.

An et magister, felix doctrinæ prædo? Acerbe illud, sed quæ sequuntur optime. Nullo enim modo ille utilis rebus humanis, qui tot egregia ingenia, tot (inquam) libera capita in servitutem redegerit. Itaque, filii, de copia vestra audistis quam arcta,

[1] *illi* MS.
[2] *condimentis* omitted in MS.
[3] *Quod si.* —MS.
[4] *abscedatis.* — MS.
[5] In the MS. *Euclidis* is inserted between the lines in Bacon's hand.
[6] *Itaque videtis in sex fortasse hominum cerebellis et animulis spes et fortunas vestras sitas esse.* — MS.
[7] *suas partes.* — MS.
[8] *Deo et* omitted in MS.
[9] *sua demum opera.* — MS.
[10] *suas* in MS.
[11] *authori.* — MS.
[12] *his.* — MS.
[13] *acceptis.*—MS. Here Gruter's copy ends.

quam ad paucos redacta. Divitiæ enim vestræ sunt paucorum census.[1] De utilitate jam attendite. At quem tandem aditum ad mentes et sensus vestros, non dicam impetrabimus (vos enim benevoli), sed struemus aut machinabimur, res siquidem difficilis? Quo fomite, qua accensione lumen vobis innatum excitabimus, idque a præstigiis luminis adventitii et infusi liberabimus? Quomodo, inquam, nos vobis dabimus, ut vos vobis reddamus? Infinita præjudicia facta sunt, opiniones haustæ, receptæ, sparsæ. Theologi multa e philosophia ista sua fecerunt, et speculativam quandam ab utraque doctrina coagmentatam condiderunt. Viri civiles, qui ad existimationis suæ fructum pertinere putant ut docti habeantur, multa ubique ex eadem scriptis suis et orationibus inspergunt. Etiam voces, filii, et verba ex dictamine ejusdem philosophiæ, et secundum ejus præscripta et placita, apposite conficta sunt; adeo ut simul ac loqui didiceritis (felicem dicam an infelicem) hanc errorum Cabalam haurire et imbibere necesse fuerit. Neque hæc tantum consensu singulorum firmata, sed et institutis academiarum, collegiorum, ordinum, fere rerumpublicarum, veluti sancita est. Huic itaque jam subito renunciabitis? idne sumus vobis authores? Atqui ego, filii, hoc non postulo, neque hujusmodi philosophiæ vestræ fructus moror, aut eos vobis interdico, neque in solitudinem aliquam vos abripiam. Utimini philosophia quam habetis, disputationes vestras ex ejus uberibus alite, sermones ornate, graviores apud vulgus hominum hoc ipso nomine estote. Neque enim philosophia vera ad hæc multum utilis vobis erit: non præsto est, nec in transitu capitur, nec ex prænotionibus intellectui blanditur, non ad vulgi captum (nisi per utilitatem et opera) descendit. Servate itaque et illam alteram, et prout commodum vobis erit adhibete: atque aliter cum natura, aliter cum populo negotiamini. Nemo enim est qui plus multo quam alius quis intelligit, quin ad minus intelligentem tanquam personatus[2] sit, ut se exuat, alteri det. Verum illud vos familiariter pro more nostro moneo, Habete Laidem dummodo a Laide non habeamini.[3] Judicium sustinete; aliis vos date, non dedite; et vos melioribus servate. Atque vide-

[1] This sentence is underlined in the MS. In Gruter's copy it is introduced before and would probably have been omitted here.

[2] Compare *De Int. Nat. Sententiæ*, XII.: *Privata Negotia* personatus *administret, rerum tamen provisus subvenerans.*

[3] Diog. Laërt. in Aristippo. — *R. L. E.*

mur minus quiddam vobis imponere[1], quod hæc quæ in manibus habetis usu vobis et honore manebunt; ideoque æquiore animo passuri estis, eadem de veritate et utilitate in dubium vocari. Verum etiamsi vos optime animati essetis, ut quæcunque hactenus didicistis aut credidistis, spretis opinionibus ac etiam rationibus vestris privatis, vel hoc ipso loco deposituri sitis, modo de veritate vobis constaret; attamen hac quoque ex parte hæremus; neque habemus fere quo nos vertamus, ut fidem vobis rei tam inopinatæ et novæ faciamus. Certe disputationis lex penitus sublata est, cum de principiis nobis vobiscum non conveniat. Etiam spes ejusdem præcisa est, quia de demonstrationibus quæ nunc in usu sunt dubitatio injecta est, atque accusatio suscepta. Atque hoc animorum statu veritas ipsa vobis non tuto committitur. Itaque intellectus vester præparandus antequam docendus, animi sanandi antequam exercendi sunt, area denique purganda antequam inædificanda: atque ad hunc finem hoc tempore convenistis. Qua igitur industria aut commoditate hoc negotium discutiemus aut agemus? Non desperandum. Inest profecto, filii, animæ humanæ, utcunque occupatæ et obsessæ, aliqua pars intellectus pura et veritatis hospita; estque ad eam aliqua molli clivo orbita deducens. Agite, filii, vos et ego viros doctos, si quid in hoc genere sumus, exuamus; et faciamus nos tanquam aliquos e plebe, et omissis rebus ipsis ex signis quibusdam externis conjecturas capiamus. Hæc enim saltem nobis cum hominibus communia sunt. Doctrina vestra, ut dictum est, fluxit a Græcis. Qualis natio? Nil mihi rei cum convitio est, filii; itaque quæ de ea dicta sunt ab aliis, nec repetam nec imitabor. Tantum dico eam nationem fuisse semper ingenio præproperam, more professoriam; quæ duo sapientiæ et veritati sunt inimicissima. Nec præterire fas est verba sacerdotis Ægyptii, præsertim ad virum e Græcia excellentem prolata, ab authore etiam nobili e Græcia relata. Is sacerdos certe verus vates fuit, cum diceret, Vos Græci semper pueri. Annon bene divinatum est? Verissime certe, Græcos pueros æternos esse; idque non tantum in historia et rerum memoria, sed multo magis in rerum contemplatione. Quidni enim sit instar pueritiæ ea philosophia, quæ garrire et causari noverit, generare et procreare non possit? Disputationibus inepta operibus inanis? Mementote ergo (ut ait propheta) rupis ex qua excisi estis, et

[1] *Atque respirare mihi nonnihil videmini*, was the original reading of the MS.

de natione cujus authoritatem sequimini, quod Græca sit, interdum cogitate. Sequitur temporis nota, qua philosophia ista vestra nata est et prodiit. Ætas erat, filii, cum illa condita fuit, fabulis vicina, historiæ egena, peregrinationibus et notitia orbis parum informata aut illustrata, quæque nec antiquitatis venerationem nec temporum recentium copiam habebat, sed utraque dignitate et prærogativa carebat. Etenim antiquis temporibus credere licet fuisse divinos viros, qui altiora quam pro hominum communi conditione saperent. Nostram autem ætatem fateri necesse est, præ illa de qua loquimur, (ut taceam ingeniorum et meditationum fructus et labores) etiam duorum fere mille annorum eventis et experientia, et duarum tertiarum orbis notitia auctam esse. Itaque videte quam anguste habitaverint vel potius conclusa fuerint illius ætatis ingenia, si rem vel per tempora vel per regiones computetis. Neque enim mille annorum historiam, quæ digna historiæ nomine sit, habebant; sed fabulas et somnia. Regionum vero tractuumque mundi quotam partem noverant? Cum omnes hyperboreos Scythas, omnes occidentales Celtas, indistincte appellarent; nil in Africa ultra citimam Æthiopiæ partem, nil in Asia ultra Gangem, multo minus novi orbis provincias, ne per auditum sane aut fama nossent; imo et plurima climata et zonas, quibus populi infiniti spirant et degunt, tanquam inhabitabiles ab illis pronuntiatæ sint: quinetiam peregrinationes Democriti, Platonis, Pythagoræ, non longinquæ profecto, sed potius suburbanæ, ut magnum aliquid celebrantur. Atque experientia, filii, ut aqua, quo largior est eo minus corrumpitur. Nostris autem temporibus (ut scitis) oceanus sinus laxavit, et novi orbes patuere, et veteris orbis extrema undique innotescunt, idque distincte ac proprie. Itaque ex ætatis et temporis natura, veluti ex nativitate et genitura philosophiæ vestræ, nil magni de ea Chaldæi prædixerint. De hominibus videamus. Qua in re optimo fato hoc fit (neque id artificio aliquo nostro cautum est, sed ipsa res hoc non solum patitur, verum etiam postulat), ut et illis honor servetur, et nos modestiam nostram tueri et retinere possimus, et tamen fidem liberare. Nos enim, filii, nec invidiæ nec jactantiæ nobis conscii sumus, nec de ingenii palma nec de placitorum regno contendimus; longe alia nostra ratio est et finis, hocque mox aperietur. Itaque antiquorum ingeniis, excellentiæ, facultati, nihil detrahimus; sed generi ipsi, viæ, instituto, authoritati, placitis, necessario derogamus. Immensum

enim est quantum scientiarum progressum deprimant; atque opinio copiæ inter maximas causas inopiæ reperitur. Atquè duo sunt viri, filii, quorum placita ex libris eorum propriis haurire licet: Plato et Aristoteles: utinam illud et reliquorum nonnullis contigisset. Sed Aristoteles, Othomannorum more, regnare se non potuisse existimavit, nisi fratres trucidasset. Idque ei, non statim sane sed postea, ex voto nimis feliciter successit. De his itaque duobus pauca dicere instituimus. Xenophontem autem tertium non adjungimus, suavem scriptorem et virum excellentem. Verum cum illis qui philosophiam tanquam ingenii peregrinationem amœnam et jucundam, non tanquam provinciam laboriosam et solicitam, susceperunt, nobis non multum rei est. Itaque hos duos viros, Platonem et Aristotelem, si quis inter maxima mortalium ingenia non numeret, aut minus perspicit aut minus æquus est. Ingenia certe illorum capacia, acuta, sublimia. Sed tamen videndum primo, cujus generis philosophantium censeri possint. Invenio enim tria genera apud Græcos eorum qui philosophiæ cultores habiti sint. Primum erat sophistarum, qui per plurimas civitates instituta profectione, et per singulas mansitantes, adolescentes, recepta mercede, sapientia imbuere professi sunt; quales fuere Gorgias, Protagoras, Hippias, quos Plato ubique exagitat, et fere in comœdiæ morem deridendos propinat. Neque enim hi rhetores tantum erant, aut orationum conscriptores, sed universalem rerum notitiam sibi arrogabant. Secundum erat eorum qui majore fastu et opinione, locis certis et sedibus fixis, scholas aperiebant, atque placita et sectam condentes aut excipientes, auditores, sectatores, successores insuper habebant. Ex quo genere erant Plato, Aristoteles, Zeno, Epicurus. Nam Pythagoras etiam auditores traxit, et sectam constituit; sed traditionum potius quam disputationum plenam, et superstitioni quam philosophiæ propiorem. Tertium autem genus erant eorum, qui remoto strepitu et pompa professoria, serio veritatis inquisitioni et rerum contemplationi dediti, et (tanquam Endymion) solitarii et quasi sopiti, sibi philosophabantur; aut adhibitis paucis (quibus idem amor erat) in colloquiorum suavitatem, destinata perficiebant; neque Galateæ more, cujus lusus in undis, disputationum procellis se oblectabant. Atque tales fuere Empedocles, Heraclitus, Democritus, Anaxagoras, Parmenides. Neque enim reperietis hos scholas aperuisse, sed tandem speculationes et inventa sua in scripta redegisse, et posteris transmisisse. Nunc autem

videtis certe, filii, quæ res agatur. Ego enim duo prima genera (utcunque se invicem abnegent et proscindant) tamen natura rei ipsius connexa esse statuo. Itaque non hæsitabo apud vos dicere, me locum Platoni et Aristoteli tribuere inter Sophistas: sed tanquam ordinis emendati et reformati. Eandem enim rem prorsus video. Aberat fortasse loci mutatio et circumcursatio, et mercedis indignitas, et inepta ostentatio; atque lucet in illis certe quiddam solennius et nobilius; sed aderant schola, auditor, secta.[1] Itaque genus ipsum profecto cernitis. Jam vero de viris ipsis aliquid separatim dicamus; institutum servantes, ut missis rebus ex signis conjiciamus. Itaque ab Aristotele exorsi, memoriam vestram, filii, testamur, si in physicis ejus et metaphysicis non sæpius dialecticæ quam naturæ voces audiatis. Quid enim solidi ab eo sperari possit, qui mundum tanquam e categoriis effecerit? qui negotium materiæ et vacui, et raritatis et densitatis, per distinctionem Actus et Potentiæ transegerit? qui animæ genus non multo melius quam ex vocibus secundæ intentionis tribuerit? Verum hæc ad res ipsas penetrant. Itaque ab hujusmodi sermone absistendum. Nam cum confutationem justam instituere immemoris plane sit, ita et opiniones tanti hominis per satyram perstringere superbum foret. Signa autem in illo non bona, quod ingenium incitatum et se proripiens, nec alienæ cogitationis nec propriæ fere patiens; quod quæstionum artifex[2], quod contradictionibus continuus, quod antiquitati infestus et insultans, quod quæsita obscuritas est; alia plurima, quæ omnia magisterium sapiunt, non inquisitionem veritatis.[3] Quod si quis ad hæc: censuram rem proclivem fortasse esse; illud interim constare, post Aristotelis opera edita, pleraque antiquorum veluti deserta exolevisse; apud tempora autem quæ sequuta sunt, nil melius inventum esse; magnum itaque virum Aristotelem, qui utrumque tempus ad se traxerit; atque verisimile esse, philosophiam in eo ipso tanquam sedes fixas posuisse, ut nihil restet nisi ut conservetur et ornetur: — Ego, filii, cogitationem hanc esse existimo hominis vel imperiti, vel partibus infecti, vel desidis. Est enim (ut dicit scriptura) desidia quæ-

[1] The words *nobis autem pro desperata habetur res, cum inquisitio veritatis transit in institutionem aut defensionem sectæ*, which followed in the MS., have a line drawn through them.

[2] Originally *Signa autem illa non bona quod ubique inanes quæstiones subdit, dein solvit; Quod in causarum explicatione, præsertim earum quæ ad particulares operationes spectant, aut propria subtilitate attonitus hæret et ambigit, aut partem rei attingit et statim se abripit: Quod contradictionibus*, &c.

[3] Originally, *et conditorem sectæ, non sanam et sinceram inquisitionem veritatis.*

dam, quæ sibi prudens videtur et septemplici rationum pondere gravior. Atque proculdubio (si verum omnino dicendum est) ista desidia hujus opinionis invenietur pars vel maxima; dum humanæ naturæ ingenita superbia, vitiis propriis non solum ignoscens verum etiam cultum quendam prophanum attribuens, laborum et inquirendi et experiendi fugam pro ea quæ prudentiæ comes sit diffidentia veneretur; neque ita multo post, socordia singulorum judicium et authoritatem universorum repræsentet et effingat. Nos vero primo illud interrogamus, an ob illud vir magnus Aristoteles, quod utrumque tempus traxerit? Certe magnus: Itane? At non major quam impostorum maximus. Imposturæ enim, atque adeo Principis Imposturæ Antichristi, hæc prærogativa singularis est. Veni (inquit veritas ipsa) in nomine patris mei, nec recipitis me: si quis venerit nomine suo, eum recipietis. Audistisne filii? sensu non proprio certe, sed pio et vero, qui in nomine paternitatis aut antiquitatis venerit non receptum iri; qui autem priora prosternendo, destruendo, authoritatem sibi usurpaverit et in nomine proprio venerit, eum homines sequi. Atque si quis unquam in philosophia in nomine proprio venit, is est Aristoteles, per omnia sibi author, quique antiquitatem ita despexit, ut neminem ex antiquis vel nominare fere dignetur, nisi ad confutationem et opprobrium. Quin et disertis verbis dicere non erubescit (bene ominatus certe etiam in maledicto), verisimile esse majores nostros ex terra aliqua aut limo procreatos fuisse, ut ex opinionibus et institutis eorum stupidis et vere terreis conjicere licet. Neque tamen illud verum est, antiquorum philosophorum opera, postquam Aristoteles de iis ex authoritate propria triumphasset, statim extincta fuisse. Videmus enim qualis fuerit opinio de prudentia Democriti post Cæsarum tempora,

> Cujus prudentia monstrat,
> Magnos posse viros, et magna exempla daturos,
> Vervecum in patria, crassoque sub aëre nasci.[1]

Atque satis constat, sub tempora excultiora imperii Romani plurimos antiquorum Græcorum libros incolumes mansisse. Neque enim tantum potuisset Aristoteles (licet voluntas ei non defuerit) ut ea deleret, nisi Attila et Gensericus et Gothi ei in hac re adjutores fuissent. Tum enim postquam doctrina humana naufragium perpessa esset, tabula ista Aristotelicæ philosophiæ, tanquam materiæ alicujus levioris et minus solidæ,

[1] Juv. x. 48.

servata est, et extinctis æmulis recepta. At quod de consensu homines sibi fingunt, id et infidum et infirmum est. An vos, filii, temporis partus habetis numeratos et descriptos in fastis, eos inquam qui perierunt, latuerunt, aut aliis orbis partibus innotuerunt? An et abortus qui nunquam in lucem editi sunt? Itaque desinant homines angustias suas mundo et sæculis attribuere et imponere. Quid si de suffragiis ipsis litem moveamus, et negemus verum et legitimum consensum esse, cum homines addicti credunt, non persuasi judicant? Transicrunt, filii, ab ignorantia in præjudicium: hæc demum est illa coitio potius quam consensus. Postremo, si de isto consensu non diffiteamur, sed eum ipsum ut suspectum rejiciamus, an nos inter morbum istum animorum grassantem et epidemicum sanitatis pœnitebit? Pessimum certe, filii, omnium augurium est de consensu in rebus intellectualibus; exceptis divinis [1], cum veritas descendit cœlitus. Nihil enim multis placet, nisi aut imaginationem feriat, ut superstitio, aut notiones vulgares, ut doctrina sophistarum: tantumque consensus iste a vera et solida authoritate abest, ut etiam violentam præsumptionem inducat in contrarium. Optime enim Græcus ille, Quid peccavi? cum complauderent. Quod si is esset vir qui putatur esse Aristoteles, tamen nullo modo vobis author sim, ut unius hominis cogitata et placita instar oraculi recipiatis. Quæ enim, filii, est ista voluntaria servitus? tantone auditoribus monachi illius ethnici deteriores estis, ut illi suum Ipse dixit post septennium deponerent, vos illud post annos bis mille retineatis? Atque nec istum ipsum præclarum authorem habuissetis, si antiquitatis studium valuisset: et tamen eadem in illum lege et conditione uti veremini. Quin, si me audietis, dictaturam istam, non modo huic homini sed et cuivis mortalium qui sunt, qui erunt, in perpetuum negabitis; atque homines in recte inventis sequemini, ut videntes lucem, non in omnibus promiscue, ut cæci ducem. Neque certe vos virium pœniteat, si experiamini: neque enim Aristotele in singulis, licet forte in omnibus, inferiores estis. Atque quod caput rei est, una certe re illum longe superatis, exemplis videlicet et experimentis et monitis temporis. Nam ut ille (quod narrant) librum confecerit in quo ducentarum quinquaginta quinque civitatum leges et

[1] In the corresponding passage in the *Novum Organum* (i. § 77.) he adds *et politicis, ubi suffragiorum jus est.*

instituta collegerit[1], tamen non dubito quin unius reipublicæ Romanæ mores et exempla plus ad prudentiam et militarem et civilem contulerint quam omnia illa. Similia etiam et in naturali philosophia evenerunt. Itane vero animati estis, ut non tantum dotes vestras proprias, sed etiam temporis dona projiciatis? Itaque vindicate vos tandem, et vos rebus addite, neque accessio unius hominis estote. De Platone vero ea nostra sententia est; illum, licet ad rempublicam non accessisset sed a rebus civilibus administrandis quodammodo refugisset propter temporum perturbationes, tamen natura et inclinatione omnino ad res civiles propensum, vires eo præcipue intendisse; neque de philosophia naturali admodum solicitum fuisse, nisi quatenus ad philosophi nomen et celebritatem tuendam, et ad majestatem quandam moralibus et civilibus doctrinis addendam et aspergendam sufficeret. Ex quo fit, ut quæ de natura scripsit nil firmitudinis habeant. Quinetiam naturam theologia, non minus quam Aristoteles dialectica, infecit et corrupit. Optima autem in eo signa (si cætera consensissent), quod et formarum cognitionem ambiret, et inductione per omnia, non tantum ad principia sed etiam ad medias propositiones uteretur: licet et hæc ipsa duo vere divina, et ob quæ nomen divini non dico tulit sed meruit[2], corruperit et inutilia reddiderit, dum et formas abstractas prensaret, et inductionis materiam tantum ex rebus obviis et vulgaribus desumeret; quod hujusmodi scilicet exempla (quia notiora) disputationibus potius convenirent. Itaque cum ei diligens naturalium rerum contemplatio et observatio deesset, quæ unica philosophiæ materia est, nil mirum si nec ingenium altum nec modus inquisitionis felix magnopere profecerint. Verum nos ex signorum consideratione nescio quo modo in res ipsas prolabimur: non enim facile separari possunt, neque ea ingrata vobis auditu fuisse arbitramur. Quinetiam fortasse et illud insuper scire vultis, quid de reliquis illis sentiamus, qui alienis, non propriis, scriptis nobis noti sunt; Pythagora, Empedocle, Heraclito, Anaxagora, Democrito, Parmenide, aliis. Atque hac de re, filii, nil reticebimus, sed animi nostri sensum integrum et sincerum vobis aperiemus. Scitote itaque, nos summa cum diligentia et cura

[1] His Republic. See the Life of Aristotle ascribed to Ammonius. Diog. Laertius says 158. V. § 27. — *R. L. E.*

[2] The words *duo — meruit* are inserted between the lines, in Bacon's hand; also the words *et inutilia reddiderit.*

omnes vel tenuissimas auras circa horum virorum opiniones et placita captasse: ut quicquid de illis, vel dum ab Aristotele confutantur, vel dum a Platone et Cicerone citantur, vel in Plutarchi fasciculo, vel in Laërtii vitis, vel in Lucretii poemate, vel in aliquibus fragmentis, vel in quavis alia sparsa memoria et mentione, inveniri possit, evolverimus; neque cursim aut contemptim, sed cum fide et deliberatione examinaverimus. Atque dubium profecto non est, quin si opiniones eorum, quas nunc per internuntios quosdam minime fidos solummodo habemus, in propriis extarent operibus, ut eas ex ipsis fontibus haurire liceret, majorem firmitudinem habituræ fuissent; cum theoriarum vires in apta et se mutuo sustinente partium harmonia, et quadam in orbem demonstratione consistant, ideoque per partes traditæ infirmæ sint. Neque negamus nos reperire, inter placita tam varia, haud pauca in contemplatione naturæ et causarum assignatione non indiligenter notata. Alios autem in aliis (ut fere fieri solet) constat feliciores fuisse. Quod si cum Aristotele conferantur, plane censemus fuisse ex iis nonnullos, qui in multis Aristotele longe et acutius et altius in naturam penetraverint; quod fieri necesse fuit, cum experientiæ cultores magis religiosi fuerint, præsertim Democritus, qui ob naturæ peritiam etiam magus habitus est. Veruntamen nobis necesse est, si simpliciter et absque persona vobiscum agere stat decretum, nomina ista magna brevi admodum sententia transmittere: esse nimirum hujusmodi philosophorum placita ac theorias veluti diversarum fabularum in theatro argumenta, in quandam veri similitudinem, alia elegantius, alia negligentius aut crassius conficta; atque habere, quod fabularum proprium est, ut veris interdum narrationibus concinniora et commodiora videantur, et qualia quis libentius crederet. Sane cum isti famæ et opinioni, tanquam scenæ, minus servirent quam Aristoteles et Plato et reliqui e scholis, puriores fuere ab ostentatione et impostura, atque eo nomine saniores; cætera similes erant. Una enim quasi navis philosophiæ Græcorum videtur, atque errores diversi, causæ errandi communes. Quinetiam nobis minime dubium est, si penes populum et civitates liberas res mansissent[1], fieri non potuisse ut humani ingenii peregrinationes

[1] Originally, *et nisi tempora sequentia et in Græcia et alibi a populi potentia ad monarchias et ad imperia magis unita et ordinata inclinassent, fieri non potuisse ut humani ingenii peregrinationes et errores, utcunque inter tantam theoriarum varietatem*

popularibus auris velificantes, utcunque inter tam numerosa et varia theoriarum commenta se sistere aut continere potuissent. Quemadmodum enim in astronomicis, et iis quibus terram rotari placet et iis qui veterem[1] constructionem tenuerunt phænomenorum in cœlis patrocinia æqua sunt; quin et tabularum calculi utrisque respondent: eodem modo ac multo etiam facilius est in naturali philosophia complures theorias excogitare, inter se multum differentes, sed tamen singulas sibi constantes, et experientiam et præsertim instantias vulgares, quæ in quæstionibus philosophicis (ut nunc fit) judicia exercere solent, in diversum trahentes, et pro testibus citantes. Neque enim defuerunt etiam nostra ætate, in nostris inquam frigidis præcordiis atque tempore quo res religionis ingenia consumpserunt[2], qui novas philosophiæ naturalis fabricas meditati sunt. Nam Telesius ex Consentia scenam conscendit et novam fabulam egit, argumento profecto magis probabilem quam plausu celebrem. Et Gilbertus ex Anglia, cum naturam magnetis laboriosissime et magna inquisitionis firmitudine et constantia, necnon experimentorum magno comitatu et fere agmine, perscrutatus esset, statim imminebat et ipse novæ philosophiæ condendæ; nec Xenophanis nomen in Xenomanem per ludibrium versum expavit, in cujus sententiam inclinabat. Quin et Fracastorius, licet sectam non condiderit, tamen libertate judicii honeste usus est. Eadem ausus est Cardanus, sed levior.[3] Atque existimo, filii, vos ad istam quam ex nobis auditis tam latam et generalem opinionum et authorum rejectionem obstupescere. Licet enim de nobis bene existimetis, tamen vereri videmini ut invidiam hujusce rei nobiscum una sustinere possitis. Quin et ipsi (credo) miramini et animi pendetis, quorsum res hæc evasura sit, et quam tandem conditionem vobis afferamus. Itaque diutius suspensos vos non tenebimus: atque simul et vos admiratione et nos invidia, ut speramus, nisi ad-

se sisterent aut finirent, sed ut aliæ multæ proculdubio fuissent novarum sectarum emanationes.

[1] *per veterem* in the MS. But I think the *per* belonged to the sentence as originally written, and was meant to be struck out. The words for which *veterem constructionem tenuerunt* are substituted are too effectually obliterated to be read. But the two first are *eccentricos et epicyclos;* and the sentence probably stood originally as in the corresponding passage of the *Cogitata et Visa — qui per eccentricos et epicyclos motus expediunt.*

[2] This clause is added between the lines in Bacon's hand.

[3] These two sentences are added in the margin in Bacon's own hand; as are also the words *in Xenomanem per* in the last sentence.

modum iniqua fuerit, exolvemus. Atque meministis profecto etiam ab initio nos tale quiddam significasse: antiquis non certe authoritatem et fidem (id enim pernitiosum), sed honorem ac reverentiam intacta et imminuta fore; tametsi possemus pro jure nostro, neque eo ipso alio quam omnium, si quid apud eos non recte inventum aut positum sit, id reprehendere aut notare. Sed res ipsa hoc non postulat; fato quodam, ut arbitramur, ad invidiam et contradictionem[1] extinguendam et depellendam meliore. Audite itaque, filii, quæ jam dicemus. Nos, si profiteamur nos meliora afferre quam antiqui, eandem quam antiqui viam ingressos, nulla verborum arte efficere possimus quin inducatur quædam ingenii vel excellentiæ vel facultatis comparatio sive contentio; non ea quidem illicita aut nova; sed impar ob virium nostrarum modum, quem eum esse satis sentimus ut non solum antiquis sed et vivis cedat. Cum autem (ut simpliciter apud vos loquamur) claudus in via (quod dici solet) cursorem extra viam antevertat, commutata ratio est. Atque[2] de via (mementote) non de viribus quæstio oritur; nosque Indicis non Judicis partes sustinemus. Itaque aperte, valejusso omni fuco et artificio, fatemur nos in hac opinione esse, omnia omnium ætatum ingenia si in unum coierint, eo quo nunc res geritur modo, hoc est (ut clare loquamur) ex meditatione et argumentatione, in scientiis magnos processus facere non posse. Quin neque hic finis; sed addimus insuper, quanto quis ingenio plus valet, eundem si naturæ lucem, id est historiam et rerum particularium evidentiam, intempestive deserat, tanto in obscuriores et magis perplexos phantasiarum recessus et quasi specus se detrudere et involvere. Annon forte animadvertistis, filii, quanta ingeniorum et acumina et robora apud philosophos scholasticos, otio et meditationibus luxuriantes et ob tenebras ipsas in quibus enutriti erant feroces, quales nobis telas aranearum pepererint, textura et subtilitate fili mirabiles, usus et commodi expertes? Etiam illud simul affirmamus; nostram quam ad artes adducimus rationem et inquisitionis formam, talem esse quæ hominum ingenia et facultates, ut hæreditates Spartanas, fere æquet. Nam quemadmodum ad hoc ut linea recta aut circulus perfectus describatur, plurimum est in manus ac visus facultate, si per constantiam manus et

[1] The words *et contradictionem* are an interlineation.
[2] *nam* originally. *Atque* substituted in Bacon's hand.

oculorum judicium tantum res tentetur; sin per regulam admotam aut circinum circumductum, non item; eadem ratione et in contemplatione rerum quæ mentis viribus solum incumbit, homo homini præstat vel maxime; in ea autem quam nos adhibemus, non multo major in hominum intellectu eminet inæqualitas quam in sensu inesse solet. Quin et ab ingeniorum acumine et agilitate (ut dictum est), dum suo motu feruntur, periculum metuimus; atque in eo toti sumus, ut hominum ingeniis non plumas aut alas, sed plumbum et pondera addamus. Nullo enim modo videntur homines adhuc nosse, quam severa sit res veritatis et naturæ inquisitio, quamque parum hominum arbitrio relinquat. Neque tamen nos peregrinum quiddam, aut mysticum, aut Deum Tragicum ad vos adducimus. Nil enim aliud est nostra via, nisi literata experientia, atque ars sive ratio naturam sincere interpretandi, et via vera a sensu ad intellectum. Verum annon videtis, filii, quid per hæc quæ diximus effectum sit? Primum Antiquis suus honos manet. Nam in iis quæ in ingenio et meditatione posita sunt, illi mirabiles viros se præstitere; neque nobis sane eam viam ingressis longo intervallo eorum progressus æquare, ut arbitramur, vires suffecissent. Deinde, intelligitis profecto, minus quiddam esse hanc rejectionem authorum generalem, quam si alios rejecissemus, alios probassemus. Tum enim judicium quoddam exercuissemus; cum nunc tantummodo (ut dictum est) indicium faciamus. Postremo etiam perspicitis, quid nobis prorsus relinquatur, sive nos aliquid sumere sive aliis aliquid nobis tribuere libeat: Non ingenii, non excellentiæ, non facultatis laus, sed fortuna quædam, ea magis vestra quam nostra, cum res sit potius usu fructuosa quam inventione admirabilis. Nam uti vos fortasse miramini, quando hoc nobis in mentem venire potuerit? ita et nos vicissim miramur, quomodo idem aliis in mentem jam pridem non venerit; non ulli mortalium cordi aut curæ fuisse, ut intellectui humano auxilia et præsidia ad naturam contemplandam et experientiam digerendam compararet; sed omnia vel traditionum caligini, vel argumentorum vertigini et turbini, vel casus et experimentorum undis et ambagibus permissa esse, nec mediam quandam viam inter experientiam et dogmata aperiri potuisse. Sed tamen mirari desinimus, cum in multis rebus videre liceat mentem humanam tam lævam et male compositam esse, ut primo diffidat et paulo post se contemnat; atque primo incredibile videatur aliquid

tale inveniri posse; postquam autem inventum sit, rursus incredibile videatur id homines tam diu fugere potuisse. Sed ut quod res est proferamus, huic rei de qua nunc agimus impedimento fuit non tam rei obscuritas aut difficultas, quam superbia humana, cui natura ipsa magna ex parte eaque potiore sordescit, quæque homines eo dementiæ provehit, ut spiritus proprios, non spiritum naturæ consulant; ac si artes facerent, non invenirent. Atque, filii, inter istam vestram tanquam per statuas antiquorum deambulationem, fieri potest ut aliquam partem porticus notaveritis velo esse discretam. Ea sunt penetralia antiquitatis ante doctrinam Græcorum. Sed quid me vocatis ad ea tempora, quorum et res et rerum vestigia aufugerunt? Annon antiquitas illa instar famæ est, quæ caput inter nubila condit et fabulas narrat? facta et infecta simul canens? Atque satis scio, si minus sincera fide agere vellem, non difficile foret hominibus persuadere, apud antiquos sapientes diu ante Græcorum tempora, scientias et philosophiam majore virtute licet majore etiam fortasse silentio floruisse: ideoque [1] solennius mihi foret, ea quæ jam afferuntur ad illa referre, ut novi homines solent, qui nobilitatem alicujus veteris prosapiæ per genealogiarum rumores et conjecturas sibi affingunt. Verum nobis stat sententia, rerum evidentia fretis, omnem imposturæ conditionem, quantumvis sit licet bella et commoda, recusare. Itaque judicium nostrum de illis sæculis non interponimus; illud obiter dicimus, licet poetarum fabulæ versatilis materiæ sint, tamen nos non multum arcani aut mysterii hujusmodi narrationibus subesse haud cunctanter pronuntiassemus, si ab iis inventæ a quibus traditæ sunt; quod nos secus esse existimamus: pleræque enim traduntur tanquam prius creditæ et cognitæ, non tanquam novæ ac tunc primo oblatæ: quæ res earum existimationem apud nos auxit, ac si essent reliquiæ quædam sacræ temporum meliorum. Verum utcunque ea res se habet, non plus interesse putamus (ad id quod agitur) utrum quæ jam proponentur aut illis fortasse majora antiquis etiam innotuerint, quam hominibus curæ esse debeat utrum novus orbis fuerit insula illa Atlantis, et veteri mundo cognita, an nunc primum reperta; rerum enim inventio a naturæ luce petenda, non a vetustatis tenebris repetenda est. Jam vero (filii) etiam sponte, non fortasse interpellati ab expectatione

[1] *idque* in MS., but compare *Cog. et Visa* (p. 605.): *Atque ideo solennius fore*, &c.

vestra, de philosophia Chimistarum opinionem subjungemus. Etenim illa vestra philosophia, disputationibus potens, operibus invalida, artis chimicæ nonnullam existimationem apud quosdam peperit. Atque sane quod ad practicam Chimistarum attinet, fabulam illam in eam competere existimamus de sene qui filiis suis aurum in vinea defossum (nec se satis scire quo loco) legaverit: unde illos protinus ad vineam fodiendam incubuisse; atque auri quidem nihil repertum, sed vindemiam ea cultura factam fuisse uberiorem. Simili modo et chimiæ filii, dum aurum (sive vere sive secus) in naturæ arvo abditum et quasi defossum laboriose eruere conantur, multa moliendo et tentando, magno proventui hominibus et utilitati fuere, et compluribus inventis non contemnendis vitam et res humanas donavere. Veruntamen speculativam eorum rem levem et minus sanam esse judicamus. Nam ut ille adolescentulus delicatus cum scalmum in littore reperisset navem ædificare concupivit, ita et hi, arti suæ indulgentes, ex paucis fornacis experimentis philosophiam condere aggressi sunt. Atque hoc genus theoriarum et sæpius et manifestius vanitatis coarguitur, quam illud alterum, quod certe magis sobrium et magis tectum est. Nam philosophia vulgaris, omnia percurrens et nonnihil fere de singulis degustans, se apud maximam hominum partem optime tuetur. Qui autem ex paucis quibus ipse maxime insuevit reliqua comminiscitur, is et re ipsa errat magis, et apud alios levior est. Atque ex hoc genere philosophiam chimicam esse censemus. Certe illa opinionis fabrica quæ eorum philosophiæ basis est, esse nimirum quatuor rerum matrices sive elementa in quibus semina rerum sive species fœtus suos absolvunt, atque producta eorum quadriformia esse, pro differentia scilicet cujusque elementi; adeo ut in cœlo, aëre, aqua, terra nulla species inveniatur quæ non habeat in tribus reliquis conjugatum aliquod et quasi parallelum (nam hominem etiam pantomimum effecerunt, ex omnibus conflatum, abusi elegantia vocabuli *microcosmi*); hoc, inquam, commentum neminem judicio sedatum post se traxerit: quin et existimamus, huic phantasticæ[1] rerum naturalium phalangi peritum naturæ contemplatorem vix inter somnia sua locum daturum. Verum illud non incommode accidit ad præcavendum, quod hæc philosophia (ut cœpimus dicere) erroris genere veluti antistropha vulgari phi-

[1] *phantastico* in MS.

losophiæ sit; vulgaris enim philosophia ad materiam inventionis parum ex multis, hæc multum e paucis decerpit. Nos tamen, filii, libenter Paracelsum (hominem, ut conjicere licet, satis vocalem[1]) nobis præconem exoptemus, ut illud *lumen naturæ*, quod toties inculcat, celebret et proclamet. Atque mentio Chimistarum nos admonet, ut aliquid etiam de Magia naturali, ea quæ nunc hoc vocabulum solenne et fere sacrum inquinavit, dicamus: ea enim inter philosophos chimicos in honore esse consuevit. Quæ nobis in hujusmodi sermone inferior videtur quam ut condemnetur: sed levitate ipsa effugiat. Quid enim illa ad nos, cujus dogmata plane phantasia et superstitio, opera præstigiæ et impostura? Nam inter innumera falsa si quid ad effectum perducitur, hujusmodi semper est, ut sit ad novitatem et admirationem conficta, non ad usum aut accommodata aut destinata. Etenim evenit fere semper de magicis experimentis quod poeta lascivus ludit, *Pars minima est ipsa puella sui.* Quemadmodum autem philosophiæ proprium est, efficere ut omnia minus quam sint admiranda videantur propter demonstrationes; ita et imposturæ non minus proprium est, ut omnia magis quam sunt admiranda videantur propter ostentationem et falsum apparatum. Atque ista tamen vanitas nescio quomodo contemnitur et recipitur; unde enim satyrion ad venerem, pulmones vulpis ad phthisim[2], nisi ex hac officina? Verum nimis multa de nugis; nimis sane, si, ut ineptæ, ita innoxiæ essent. Resumamus orationis filum, et philosophiam quam in manibus habemus ex signis excutiamus; ista enim, filii, inseri oportuit ad intellectus vestri præparationem, quæ res sola nunc agitur. Duplex enim est animorum præoccupatio seu mala inclinatio ad nova, quando ea proponi contigerit: una ab insita opinione de placitis receptis, altera ab anticipatione sive præfiguratione erronea de re ipsa quæ affertur, ac si pertineret ad aliqua ex jampridem damnatis et rejectis, aut saltem ad ea quæ animus ob levitatem aut absurditatem fastidit. Itaque jam reversi de signis dispiciamus. Atque, filii, inter signa nullum est magis certum aut nobile quam ex fructibus. Quemadmodum enim in religione cavetur ut fides ex operibus monstretur, idem etiam ad philosophiam optime traducitur, ut vana sit quæ

[1] There are no marks of parenthesis here in the MS.; nor even a comma after either *Paracelsum* or *vocalem*. But the sense seems to require the clause to be taken parenthetically.

[2] Pulmones vulpis lienem juvant, non autem phthisin ut scriptum. Vid. Plin. xxviii. 57. — *R. L. E.*

sterilis. Atque eo magis, si loco fructuum uvæ vel olivæ, producat disputationum et contentionum carduos et spinas. De vestra autem philosophia vereor ne nimis vere cecinerit poeta non solum illo carmine,

Infelix lolium et steriles dominantur avenæ [1]:

Sed et illo,

Candida succinctam latrantibus inguina monstris.[2]

Videtur enim illa ex longinquo visa virgo, specie non indecora, sed partibus superioribus: habet enim generalia quædam non ingrata, et tanquam invitantia; cum vero ad particularia ventum sit, veluti ad uterum et partes generationis, atque ad id ut aliquid ex se edat, tum demum loco operum et actionum, quæ contemplationis proles est digna et legitima, monstra illa invenias resonantia et oblatrantia, et ingeniorum naufragiis famosa. Atque hujus mali author imprimis Aristoteles, altrix ista vestra philosophia. Illi enim vel ludo vel gloriæ erat, quæstiones minus utiles primo subornare, deinde confodere; ut pro assertore veritatis contradictionum artifex sit. Pessimo enim et exemplo et successu scientia traditur per quæstiones subministratas earumque solutiones. Qui enim bene affirmat et probat et constituit et componit, is errores et objectiones longe summovet et veluti eminus impedit et abigit; qui autem cum singulis colluctatur, is exitum rei nullum invenit sed disputationes serit. Quid enim opus sit ei qui unum luminis et veritatis corpus clarum et radiosum in medio statuit, parva quædam et pallida confutationum ellychnia ad omnes errorum angulos circumferre, solventi alia dubia, alia per ipsam illam solutionem excitanti ac veluti generanti? Verum id curæ, ut videtur, præcipue fuit Aristoteli, ut homines haberent parata in singulis quæ pronunciarent, quæ responderent, et per quæ se expedirent, potius quam quid penitus crederent, aut liquido cogitarent, aut vere scirent. Philosophia autem vestra tam bene authorem refert, ut quæstiones quas ille movit illa figat et faciat æternas; ut quæri videatur, non ut veritas eruatur, sed ut disputatio alatur: adeo ut Nasicæ sententia illi Catonis præponderet.[3] Neque enim illud agitur ut temporis progressu sublatis dubiis tanquam hostibus a tergo, ad ulteriores provincias penetretur; sed ut

[1] Georg. i. 154. [2] Æn. vi. 75.
[3] Plutarch in Catone, 352. — *R. L. E.*

perpetuæ istæ quæstiones, tanquam Carthago, militiam istam disputandi exerceant. Quod vero ad operum fructum et proventum attinet; existimo ex ista philosophia, per tot annorum spatia laborata et culta, ne unum quidem experimentum adduci posse, quod ad hominum statum levandum et locupletandum spectet, et philosophiæ speculationibus vere acceptum referri possit: adeo ut brutorum animalium instinctus plura inventa pepererint, quam doctorum hominum sermones. Sane Celsus ingenue et prudenter fatetur, experimenta medicinæ primo inventa fuisse, ac postea homines circa ea philosophatos esse, et causas explorasse et assignasse; non ordine inverso evenisse, ut ex philosophia et causarum cognitione ipsa experimenta deprompta essent. Neque hic finis. Non male enim merita esset philosophia ista de practica, licet eam experimentis non auxisset, si tamen usum ejus castiorem et prudentiorem reddidisset (quod fortasse facit), atque interim ejus incrementis et progressibus nihil obfuisset. Illud autem magis damnosum et perniciosum, quod inventa non solum non edat, sed etiam opprimat et extinguat. Nam affirmare licet, filii, verissime, Aristotelis de quatuor elementis commentum, rem certe obviam et pinguem (quia hujusmodi corpora in maxima quantitate et mole cernuntur), cui tamen ille potius authoritatem quam principium dedit (cum Empedoclis esset[1]; a quo etiam melius erat positum); quod postea avide a medicis arreptum, quatuor complexionum, quatuor humorum, quatuor primarum qualitatum conjugationes post se traxit; tanquam malignum et infaustum sidus infinitam et medicinæ et compluribus rebus mechanicis sterilitatem attulisse; dum homines per hujusmodi concinnitates et compendiosas ineptias sibi satisfieri patientes, nil amplius curant; et vivas et utiles rerum observationes prorsus omiserunt. Itaque si illud verum, *ex fructibus eorum*, videtis certe quo res redierit. Agite vero, filii, et signa ex incrementis capiamus. Certe si ista doctrina plane instar plantæ a stirpibus suis revulsæ non esset, sed gremio et utero naturæ adhæreret, atque ab eadem aleretur; id minime eventurum fuisset, quod per annos bis mille jam fieri videmus, ut scientiæ in eodem fere statu maneant et hæreant, neque augmentum aliquod memorabile sumpserint. Poliuntur fortasse nonnunquam ab aliquo, et illustrantur et accommo-

[1] That Empedocles was the first is said by Arist. *Met.* i. 3. — *R. L. E.* The words within the parenthesis are not found in the corresponding passage of the *Cogitata et Visa*.

dantur (dum tamen interim ab infinitis lacerentur et deformentur et inquinentur), sed utcunque non dilatantur aut amplificantur. In artibus autem mechanicis contra evenire videmus; quæ ut spiritu quodam repletæ vegetant et crescunt; primo rudes, deinde commodæ, post excultæ, sed perpetuo auctæ. Philosophia autem et scientiæ intellectus statuarum more adorantur et celebrantur, sed non moventur. Quinetiam in primo nonnunquam authore maxime florent, et deinceps declinant et exarescunt. Neque vero mirum est ista discrimina inter mechanicam et philosophiam conspici, cum in illa singulorum ingenia misceantur, in hac corrumpantur et destruantur. Quod si quis existimet, scientiarum ut rerum cæterarum esse quendam statum, idque fere in tempus unius authoris incidere, qui beneficio temporis usus, et suæ ætatis princeps, inspectis reliquis scriptoribus et judicatis, scientias ipsas absolvat et perficiat; quod postquam factum sit, juniores rite palmas secundas petere, ut hujusmodi authoris opera vel explicent vel digerant, vel pro sui sæculi ratione palato accommodent et vertant: næ ille majorem rebus humanis prudentiam et ordinem et felicitatem tribuit, quam experiri fas est; res enim casum recipit, nisi quod vanitas hominum etiam fortuita in deterius detorquet. Nam vere sic se res habet; postquam scientia aliqua multorum observatione et diligentia, dum alius alia apprehendit, per partes tentata serio et tractata sit, tum exoriri aliquem mente fidentem, lingua potentem, methodo celebrem, qui corpus unum ex singulis pro suo arbitrio efficiat et posteris tradat: plerisque corruptis et depravatis, et cum certissima omissione omnium quæ altiores et digniores contemplationes exhibere possint, ut opinionum immodicarum et extravagantium: et posteri rursus facilitate rei et compendio gaudentes, sibi gratulantur ac nil ulterius quærunt, sed ad illa ministeria servilia quæ diximus se convertunt. Verum vobis, filii, pro certo sit, quæ in natura fundata sunt, ut aquas perennes, perpetuo novas scaturigines et emanationes habere; quæ autem in opinione versantur, variari fortasse sed non augeri. Habemus et aliud signum; si modo signi appellatio in hoc competit, cum potius testimonium sit, imo testimoniorum omnium validissimum; hoc est propriam authorum quorum fidei vos committitis confessionem et judicium. Nam et illi ipsi qui dictaturam quandam in scientiis invaserunt, et tanta fiducia de rebus pronuntiant, tamen per intervalla, cum ad se redeunt, ad querimonias demum de na-

turæ subtilitate, rerum obscuritate, humani ingenii infirmitate, et similia se convertunt. Neque propterea, filii, hæc modestiæ aut humilitati, virtutibus in rebus intellectualibus omnium felicissimis deputetis: non tam faciles, aut boni fueritis: cum contra, ista non confessio, sed professio sive prædicatio, ex superbia, invidia, atque id genus affectibus ortum pro certo habeat; id enim prorsus volunt, quicquid in scientiis sibi ipsis aut magistris suis incognitum aut intactum fuerit, id extra terminos possibilis poni et removeri: hæc est illa modestia atque humilitas. Itaque pessimo fato res geritur. Nil enim in his rerum humanarum angustiis aut ad præsens magis deploratum aut in futurum magis ominosum est, quam quod homines ignorantiam etiam ignominiæ (ut nunc fit) eximant, atque artis suæ infirmitatem in naturæ calumniam vertant; et quicquid ars illa sua non attingit, id ex arte scitu aut factu impossibile supponant. Neque sane damnari potest ars, cum ipsa judicet. Ex hoc fonte haud paucas opiniones et placita in philosophia reperiatis, quæ nihil aliud quam quæsitam istam et artificiosam et in cognoscendo et in operando desperationem, ad artis decus et gloriam perditissimo hoc modo tuendum, sapiant et foveant. Hinc schola Academica, quæ Acatalepsiam ex professo tenuit, et homines ad sempiternas tenebras damnavit. Hinc opinio, quod formæ sive veræ rerum differentiæ inventu impossibiles sunt; ut homines in atriis naturæ perpetuo obambulent, nec intra palatium aditum sibi muniant. Hinc positiones illæ infirmissimæ, calorem solis et ignis toto genere differre, atque compositionem opus hominis, mistionem opus solius naturæ esse; ne forte ars naturam, ut Vulcanus Minervam[1], sollicitare aut expugnare tentet aut speret; et complura hujusmodi, quæ tam ad confessionem tenuitatis propriæ, quam ad repressionem[2] industriæ alienæ pertinent. Itaque neutiquam vobis, filii, pro amore et indulgentia nostra consuluero, ut cum rebus non solum desperatis sed et desperationi devotis fortunas vestras misceatis. Verum, filii, tempus fugit, dum capti amore et rerum et vestrum circumvectamur, ac omnia movemus, et initiationem hanc vestram, instar Aprilis aut veris cujusdam ad congelationem omnem et obstinationem solvendam et aperiendam esse

[1] Schol. in Il. B. 547. — *R. L. E.*

[2] The words *tenuitatis ... repressionem* are inserted between the lines in Bacon's hand. And there are two or three other interlineations in the latter part of the MS. of the same kind, where it is evident (as it is here) that words had been omitted by the carelessness of the transcriber.

cupimus. Restat signum certissimum de modis. Modi enim faciendi sunt potentiâ res ipsæ; et prout bene aut prave institutæ fuerint, ita res et effecta se habent. Itaque si modi hujus vestræ philosophiæ condendæ nec debiti sint nec probabiles, non videmus quam spem foveatis, nisi credulam et levem. Atque certe, filii, si obeliscus aliquis magnitudine insignis ad triumphi fortasse aut hujusmodi magnificentiæ decus transferendus esset, atque id homines nudis manibus tentarent; annon eos helleboro opus habere cogitaretis? quod si numerum operariorum augerent, atque hoc modo se valere posse confiderent, annon tanto magis? quod si etiam delectum adhiberent, et imbecilliores separarent, et robustis tantum et vigentibus uti vellent, et hinc demum se voti compotes fore præsumerent, aut ne hoc quidem contenti, etiam artem athleticam consulerent, ac omnes cum manibus et lacertis et nervis ex arte bene unctis et medicatis adesse juberent; annon prorsus eos dare operam ut cum ratione quadam et prudentia insanirent, clamaretis? Et tamen simili homines malesano impetu feruntur in intellectualibus, dum intellectum veluti nudum applicant, et ab ingeniorum vel multitudine vel excellentia magna sperant, vel etiam dialecticis, quæ mentis quædam athletica censeri possit, ingeniorum nervos roborant; neque machinas adhibent, per quas vires et singulorum intendantur et omnium coëant. Atque ut menti debita auxilia non subministrant; ita nec naturam rerum debita observantia prosequuntur. Quid enim dicemus? an nihil aliud est philosophiam condere, quam ex paucis vulgaribus et obviis experimentis de natura judicium facere, ac dein tota sæcula in meditationibus volutare? Atque, filii, nesciebam nos tam naturæ fuisse familiares, ut ex tam levi et perfunctoria salutatione ea nobis aut arcana sua patefacere, aut beneficia impertire dignaretur. Certe nobis perinde facere videntur homines, ac si naturam ex longinqua et præ-alta turri despiciant et contemplentur; quæ imaginem ejus quandam, seu nubem potius imagini similem, ob oculos ponat: rerum autem differentias (in quibus res hominum et fortunæ sitæ sunt), ob earum minutias et distantiæ intervallum, confundat et abscondat. Et tamen laborant et nituntur, et intellectum tanquam oculos contrahunt, ejusdemque aciem meditatione figunt, agitatione acuunt, quinetiam artes argumentandi veluti specula artificiosa comparant, ut istiusmodi differentias et subtilitates naturæ mente comprehendere et vincere possint. Atque ridicula certe esset et

præfracta sapientia et sedulitas, si quis ut perfectius et distinctius cerneret, vel turrim conscendat vel specula applicet vel palpebras adducat, cum ei liceat absque universa ista operosa et strenua machinatione et industria fieri voti compos per rem facilem, et tamen ista omnia beneficio et usu longe superantem: hoc est, ut descendat et ad res propius accedat. Atque certe in intellectus usu similis nos exercet imprudentia. Neque, filii, postulare debemus ut natura nobis obviam eat: sed satis habemus, si accedentibus nobis, idque cultu debito, se conspiciendam det. Quod si cui in mentem veniat opinari tale quippiam: etiam antiquos atque ipsum Aristotelem proculdubio a meditationum suarum principio magnam vim et copiam exemplorum sive particularium paravisse, atque eandem viam, quam nos veluti novam indicamus et signamus, revera iniisse et confecisse, adeo ut actum agere videri possimus: certe, filii, hæc de illis cogitare non est integrum; formam enim et rationem suam inquirendi et ipsi profitentur et scripta eorum imaginem expressam præ se ferunt. Illi enim statim ab inductionibus nullius pretii ad conclusiones maxime generales, tanquam disputationum polos, advolabant, ad quarum constantem et immotam veritatem reliqua expediebant. Verum scientia constituta, tum demum siqua controversia de aliquo exemplo vel instantia mota esset, ut positis suis refragante, non id agebant ut positum illud emendaretur; sed, posito salvo, hujusmodi instantias quæ negotium faciebant, aut per distinctionem aliquam subtilem et sapientem in ordinem redigebant, aut per exceptionem plane (homines non mali) dimittebant.[1] Quod si instantiæ aut particularis rei, non contradictoriæ reconciliatio, sed obscuræ ratio, quæreretur, eam ad speculationes suas quandoque ingeniose accommodabant, quandoque misere torquebant: quæ omnis industria et contentio res sine fundamento nobis videtur. Itaque nolite commoveri, quod frequens alicubi inter nonnulla Aristotelis scripta inveniatur exemplorum et particularium mentio. Noveritis enim, id sero et postquam decretum fuisset factum fuisse. Illi enim mos erat non liberam experientiam consulere, sed captivam ostentare; nec eam ad veritatis inquisitionem promiscuam et æquam, sed ad dictorum suorum fidem sollicitatam et electam adducere. Neque rursus tale aliquod vobiscum cogitate, eam quam nos tantopere desideramus differentiarum subtilitatem in distinctionibus philosopho-

[1] *dmittebant* in MS.

rum scholasticorum haberi, atque adeo elucescere: neque enim existimetis, ab hac præpostera subtilitate primæ negligentiæ et festinationi et temeritati subventum esse. Longe abest, filii, ut hoc fieri possit; quin credite mihi, quod de fortuna dici solet id de natura verissimum est, eam a fronte capillatam, ab occipitio calvam esse. Omnis enim ista sera subtilitas et diligentia, postquam verum tempus observationis præterierit, naturam prensare aut captare potest, sed nunquam apprehendere aut capere. Equidem satis scio, idque vos non ita multo post experiemini, postquam veræ et nativæ rerum subtilitati, et differentiis in experientia signatis et expressis et sensui subjectis aut saltem per sensum in lucem extractis, paululum insuevistis; continuo subtilitatem illam alteram disputationum et verborum, quæ cogitationes vestras non sine magna admiratione occupavit et tenuit, quasi pro re ludicra et larva quadam et incantatione habituri sitis. Quare missis istis philosophiis abstractis, vos et ego, filii, rebus ipsis nos adjungamus: neque ad sectæ condendæ gloriam animum adjiciamus; sed utilitatis et amplitudinis humanæ curam serio suscipiamus; atque, inter mentem et naturam connubium castum et legitimum (pronuba misericordia divina) firmemus; precati etiam Deum, cujus numine et nutu hæc fiunt, quique ut hominum et rerum, ita luminum et consolationum pater est, ut ex illo connubio non phantasiæ monstra, sed stirps heroum quæ monstra domet et extinguat, hoc est inventa salutaria et utilia ad necessitates humanas (quantum fieri datur) debellandas et relevandas, suscipiatur. Hoc epithalamii votum sit. Certe, filii, facultates artium et scientiarum omnium consensu aut empiricæ aut rationales sunt. Has autem bene commistas et copulatas adhuc videre non licuit. Empirici enim, formicæ more, congerunt tantum et utuntur. Rationales autem, aranearum more, telas ex se conficiunt. Apis ratio media est, quæ materiam ex floribus tam horti quam agri elicit, sed simul etiam eam propria facultate vertit et digerit. Neque absimile veræ philosophiæ opificium est, quæ ex historia naturali et experimentis mechanicis præbitam materiam, non in memoria integram, sed in intellectu mutatam et subactam reponit. Itaque hujusmodi mellis cœlestia dona sperate: neque dicite cum pigro, Leo est in via: sed vincla quæ vos premunt excutite, et vos recipite. Atque sane, post virtutem vestram propriam, nihil animos vobis magis addiderit, quam si industriam et felicitatem et facinora ætatis nostræ cogitetis. Nos

nostrum *plus ultra* antiquorum *non ultra* haud vane opposuimus. Nos iidem, contra antiquorum *non imitabile fulmen* esse, *imitabile fulmen* esse, minime dementes sed sobrii, ex novarum machinarum experimento et demonstratione pronuntiamus. Quin et cœlum ipsum imitabile fecimus. Cœli enim est, circuire terram: quod et nostræ navigationes pervicerunt. Turpe autem nobis sit, si globi materiati tractus, terrarum videlicet et rium, nostris temporibus in immensum aperti et illustrati sint: globi autem intellectualis fines, inter veterum inventa et angustias steterint. Neque parvo inter se nexu devincta et conjugata sunt ista duo, perlustratio regionum et scientiarum. Plurima enim per longinquas navigationes et peregrinationes in natura patuerunt, quæ novam sapientiæ et scientiæ humanæ lucem affundere possint, et antiquorum opiniones et conjecturas experimento regere. Eadem duo, non ratione solum sed etiam vaticinio, conjuncta videntur. Nam eo prophetæ oraculum haud obscure spectare videtur, ubi de novissimis temporibus loquutus, illud subjungit, *Multi pertransibunt, et multiplex erit scientia:* ac si orbis terrarum pertransitus sive peragratio, et scientiarum augmenta sive multiplicatio, eidem ætati et sæculo destinarentur. Præsto etiam est Imprimendi artificium veteribus incognitum, cujus beneficio singulorum inventa fulguris modo transcurrere possint et subito communicari, ad aliorum studia excitanda et inventa miscenda. Quare utendum est ætatis nostræ prærogativa, neque committendum, ut cum hæc tanta vobis adsint vobis ipsi desitis. Nos autem, filii, ab animorum vestrorum præparatione auspicati, in reliquis vobis non deerimus. Probe enim novimus tabellas mentis a tabellis communibus differre. In his non alia inscripseris nisi priora deleveris, in illis priora ægre deleveris nisi nova inscripseris. Itaque rem in longum non differemus: illud itidem vos monentes, ne tanta vobis de nostris inventis polliceamini, quin meliora a vobis ipsis speretis. Nos enim Alexandri fortunam nobis spondemus (neque vanitatis nos arguatis antequam rei exitum audiatis); illius enim res gestæ recenti memoria ut portentum accipiebantur; ita enim loquitur unus ex æmulis oratoribus, *Nos certe vitam humanam non degimus; sed in id nati sumus, ut posteri de nobis portenta prædicent;* sed postquam deferbuisset ista admiratio atque homines rem attentius introspexissent, operæ pretium est animadvertere, quale judicium de eo faciat scriptor Romanus, *Nil aliud quam bene ausus est vana*

contemnere. Ita et nos simile quiddam a posteris audiemus; postquam emancipati, et sui jam facti, et proprias vires experti, initia nostra magnis intervallis superaverint. In quo sane judicio, illud recte, nostra nil magni esse: illud non recte, si ausis tribuant quæ humilitati debentur : humilitati (inquam) et privationi cuidam istius humanæ superbiæ, quæ universa perdidit, quæque volucres quasdam meditationes loco divinæ in rebus signaturæ consecravit. Hac enim ex parte revera nobis gratulamur, et eo nomine felices nos et bene de genere humano meritos esse existimamus, quod ostendimus quid vera et legitima spiritus humani humiliatio possit. Verum quid nobis ab hominibus debeatur, ipsi viderint. Nos certe nos nostraque vobis debemus.

Omnibus qui aderant digna magnitudine generis et nominis humani oratio visa est, et tamen libertati quam arrogantiæ propior. Ita autem inter se colloquebantur: se instar eorum esse, qui ex locis opacis et umbrosis in lucem apertam subito exierint, cum minus videant quam prius; sed cum certa et læta spe facultatis melioris.

Tum ille qui hæc narrabat; tu vero quid ad ista dicis? inquit. Grata sunt (inquam) quæ narrasti. Atque (inquit) si sunt ut dicis grata, si tu forte de his rebus aliquid scripseris, locum invenias ubi hæc inseras, neque peregrinationis nostræ fructus perire patiaris. Æquum postulas, inquam, neque obliviscar.

FRANCISCI BACON

COGITATA ET VISA:

DE

INTERPRETATIONE NATURÆ, SIVE DE SCIENTIA OPERATIVA.

PREFACE

TO THE

COGITATA ET VISA.

THE *Cogitata et Visa* stands first in Gruter's volume of 1653, where it first appeared. That a work with that title was composed about the year 1607 may be inferred from the date (1607) of a letter addressed by Bacon to Sir Thomas Bodley "after he had imparted to him a writing entitled *Cogitata et Visa;*" from a letter addressed (19 Feb. 1607) by Sir Thomas Bodley to Bacon, giving his opinion of it; and from an entry in the *Commentarius Solutus* (26 July, 1608) "Imparting my *Cogitata et Visa*, with choice, ut videbitur." Whether the writing here spoken of was exactly the same as that which Gruter published it is of course impossible to say. The following allusion in Bacon's letter to Bodley—"If you be not of the lodgings chalked up, whereof I speak in my preface"—would seem rather to imply that it was not; there being no preface to the *Cogitata* as printed by Gruter, nor any allusion to the chalked lodgings anywhere in the work. And it is otherwise probable that it underwent many alterations before it attained its final shape, in which it must certainly be reckoned among the most perfect of Bacon's productions. Allowance being made however for this uncertainty, we need not scruple to place it here. It covers most of the ground occupied by the first book of the *Novum Organum*, and was intended to be followed by an example of a true inductive investigation, with all its apparatus of tables, &c., as applied to one or two particular subjects; which would have covered the same ground which the second book of the *Novum Organum* was meant to occupy.

For the text, there are only two authorities that I know of; namely the copy printed by Gruter, and a manuscript in the library of Queen's College, Oxford[1]; a very beautiful manuscript, carefully corrected throughout in Bacon's own hand, and perfect but for the loss of a leaf in the middle. The differences between the two, though not otherwise material, are sufficient to prove that neither can have been taken from the other; and as the manuscript is fuller in some places, and the printed copy in others, it is difficult to say which was the later. The manuscript however is certainly the more accurate; and has certainly been revised by Bacon himself,—a fact which we cannot be so sure of with regard to the other. I have therefore, by permission of the Provost of Queen's College, printed the text from it; giving in the notes the readings of Gruter's copy, where there is any difference between them.

The notes which do not relate to these variations are Mr. Ellis's.

J. S.

[1] CCLXXX. fo. 205.

FRANCISCI BACON

COGITATA ET VISA:

DE

INTERPRETATIONE NATURÆ, SIVE DE SCIENTIA OPERATIVA.[1]

Franciscus Bacon sic cogitavit; Scientiam in cujus possessione genus humanum adhuc versatur, ad certitudinem et magnitudinem operum non accedere. Medicos siquidem morbos complures insanabiles pronuntiare, et in reliquorum cura sæpius errare et deficere: Alchimistas in spei suæ amplexibus senescere et immori: Magorum opera fluxa, nec fructuosa: Mechanicas artes non multum lucis a philosophia petere, sed experientiæ telas, lentas sane ac humiles, paulatim continuare: Casum, authorem rerum proculdubio utilem; sed qui per longas ambages et circuitus donaria sua in homines spargat. Itaque visum est ei, Inventa hominum quibus utimur admodum imperfecta et immatura censeri: Nova vero, hoc scientiarum statu, nonnisi per sæculorum spatia expectari; eaque ipsa quæ hactenus humana exhibuit industria, Philosophiæ haud attribui.

Cogitavit et illud; in his[2] rerum humanarum angustiis, id maxime et ad præsens deploratum et in futurum ominosum esse; quod homines, contra bonum suum, cupiunt ignorantiam ignominiæ eximere, et sibi per inopiam istam satisfieri. Medicus enim præter cautelas practicæ[3] suæ (in quibus ad existimationem Artis tuendam haud parum præsidii est), hanc generalem veluti totius Artis cautelam advocat; quod Artis suæ infirmitatem in Naturæ calumniam vertit, et quod Ars non attingit, id ex arte impossibile in Natura supponit. Neque certe damnari potest Ars, cum ipsa judicet. Etiam Philosophia ex qua medicina ista (quam

[1] The title in Gruter's copy is: *Francisci Baconi De Verulamio, Cogitata et Visa de Interpretatione Naturæ, sive de Inventione Rerum et Operum.*

[2] *iis.* — G. [3] *artis.* — G.

in manibus habemus) excisa est, habet et illa et in sinu nutrit quædam posita aut placita, in quæ si severius inquiratur, hoc omnino persuaderi volunt, Nil arduum aut in natura imperiosum ab arte vel ope humana expectari debere. Ab hoc fonte illud: Calorem Astri sive Solis et calorem Ignis toto genere differre: et illud, Compositionem opus hominis, at Mistionem opus solius naturæ esse, et similia: quæ si diligentius notentur, omnino pertinent ad humanæ potestatis circumscriptionem malitiosam, et ad quæsitam et artificiosam desperationem, quæ non solum spei auguria sed etiam experiendi aleas abjiciat, et omnis[1] industriæ stimulos et nervos incidat[2]; dum de hoc tantum soliciti sunt, ut Ars perfecta censeatur, et gloriæ vanissimæ et perditissimæ dant operam, scilicet ut quicquid inventum non sit, id nec inveniri posse credatur. Alchimista vero, ad Artis suæ sublevationem, errores proprios reos substituit; secum accusatorie reputando, se aut Artis et Authorum vocabula non satis intellexisse, unde ad traditionum et ore tenus eloquiorum susurros animum applicat; aut in practicæ scrupulis, proportionibus et momentis aliquid titubatum esse, unde experimenta fœlicioribus (ut putat) auspiciis in infinitum repetit: ac interim, cum inter experimentorum vertiginosas ambages[3] in Inventa quædam aut ipsa facie nova, aut utilitate non contemnenda impingat, hujusmodi pignoribus animum pascit, eaque in majus ostentat et celebrat, reliqua spe sustentat. Magus, cum nonnulla supra naturam (pro suo nimirum captu) prorsus effici videat; postquam vim semel naturæ factam intelligit, imaginationi alas addit, remque magis et minus recipere vix putat; quare maximarum rerum sibi adeptionem spondet; non videns esse subjecta certi cujusdam et fere definiti generis, in quibus Magia et superstitio per omnes nationes et ætates potuerit et luserit. Mechanicus autem, si ei contigerit jam pridem inventa subtilius polire, vel ornare elegantius; aut quæ separatim observaverit componere et simul repræsentare; aut res cum usu rerum commodius et fœlicius copulare; aut opus majore aut etiam minore quam fieri consuevit mole et volumine exhibere; se demum inter rerum Inventores numerat. Itaque satis constabat ei, homi-

[1] *omnes.*—G.

[2] Compare this with what is said of Galen in the *Temporis Partus Masculus* [supra, p. 531.].

[3] This remarkable phrase occurs also in the *Temporis Partus Masculus* [see p. 539.]; a coincidence which, with other points of resemblance, seems to indicate that the *Cogitata et Visa* and the *Temporis Partus* were written about the same time.

nes rerum Inventionem ut conatum irritum fastidire[1]; vel credere, extare quidem Inventa nobilia, sed inter paucos summo silentio et religione quadam cohiberi; vel huc descendere, ut minores istas industrias et Inventorum additamenta pro novis Inventis æstiment; quæ omnia eo redeunt, ut animos hominum a legitimo et constanti labore, et a nobilibus et genere humano dignis Inventorum pensis avertant.

Cogitavit et illud; homines eum operum varietatem et pulcherrimum apparatum, quæ per artes Mechanicas ad cultum humanum congesta sit[2], oculis subjiciant[3]; eo inclinare, ut potius ad opulentiæ humanæ admirationem quam ad inopiæ sensum accedant; minime videntes, primitivas hominis observationes et Naturæ operationes quæ animæ aut primi motus instar ad omnem illam varietatem sint, nec multas nec alte petitas esse: cætera ad patientiam hominum, et subtilem et ordinatum manus vel instrumentorum motum tantum[4] pertinere: atque in hac parte officinam eum Bibliotheca mire congruere, quæ et ipsa tantam librorum varietatem ostentet, in quibus si diligentius introspicias, nil aliud quam ejusdem rei infinitas repetitiones reperias, tractatu[5] novas, inventione præoccupatas. Itaque visum est ei, opinionem copiæ inter causas inopiæ poni: et tum opera tum doctrinas ad intuitum numerosa, ad examen pauca esse.

Cogitavit et illud; eas quas habemus doctrinas ea ambitione et affectatione proponi, atque in eum modum efformatas ac veluti personatas in conspectum venire, ac si singulæ artes omni ex parte perfectæ essent et ad exitum perductæ. Hujusmodi enim methodis et iis partitionibus tradi, quæ omnia prorsus quæ in illud subjectum cadere possunt tractatu[6] complecti et concludere videantur. Atque licet membra illa male impleta et quod ad vividum aliquem rerum succum attinet destituta sint, Totius tamen cujusdam formam et rationem præ se ferre: eoque rem perduci, ut pauca quædam, neque illa ex optimo delectu recepta Authorum scripta, pro integris ipsis et propriis Artibus habeantur. Cum tamen primi et antiquissimi veritatis inquisitores, meliore fide ac eventu, Scientiam quam ex rerum contemplatione decerpere et in usum condere statuebant, in Aphorismos fortasse sive breves eas-

[1] *Itaque visum est ei, homines rerum et artium novarum inventionem, ut conatum inanem et suspectum, fastidire.*—G.
[2] *sunt.*—G. [3] *subjiciunt.*—G. [4] *tantum* om. G.
[5] *tractandi modis et structura quadam.*—G. [6] *tractatu.*—G.

demque sparsas nec methodis revinctas sententias, conjicere solerent: quæ cum et rerum inventarum nuda simulachra, et rerum non inventarum manifesta spatia et vacua indicarent, minus fallebant; atque hominum ingenia et meditationes ad judicandum et ad inveniendum simul excitabant. At nunc scientias iis modis exhiberi quæ fidem usurpent, non judicium solicitent, et authoritate tristi lætis Inventionum conatibus intercedant: Adeo ut omnis successio et devolutio disciplinarum personas Magistri et auditoris complectatur, non Inventoris et ejus qui Inventis addat: unde necessario evenire, ut Scientiæ suis hæreant vestigiis, nec loco omnino moveantur; quod et per multa jam sæcula usuvenit; eousque, ut non solum assertio maneat assertio, sed etiam quæstio maneat quæstio, et eodem plane statu alatur. Quare visum est ei, Columnas non ultra progrediendi magnopere fixas esse[1]; et mirum minime esse id haud obtineri, cujus adipiscendi homines nec spe nec desiderio teneantur.

Cogitavit et illud; quæ de hominum tum desperatione tum fastu dicta sunt, quod ad plerosque scientiarum sectatores attinet, nimis alte petita esse. Turbam enim longe maximam prorsus aliud agere: Doctrinam siquidem vel animi et delectationis causa petere, vel ad usum et emolumentum professorium, vel etiam ad ornamentum et existimationis suæ adminiculum: Quæ si ut fines[2] scientiarum proponantur, tantum abest ut homines id velint, ut ipsa doctrinarum massa augmentum sumat; ut ex ea quæ præsto est massa, nil amplius quærant quam quantum ad usum destinatum verterc et decoquere possint. Si quis autem in tanta multitudine scientiam affectu ingenuo et propter se expetat; invenietur tamen rerum potius varietatem[3] quam veritatem aucupari: Quod si et veritatis sit inquisitor severior, illa ipsa tamen veritas erit hujusmodi, quæ res jam in lucem proditas subtilius explicet; non quæ novam lucem excitet. Sin adhuc studium cujuspiam in tantum expandatur, ut et novam lucem ambiat; eam scilicet lucem adamabit, quæ ex longinquo contemplationes speciosas ostentet, non quæ ex propinquo opera et Inventa nobilia demonstret. Quare visum est ei, eodem rursus referri; scilicet mirum non utique esse curriculum non confici, cum homines ad hujusmodi minora deflectant: multo magis, cum nec ipsa

[1] *fixas esse et quasi fatales.*—G. [2] *finis.*—G.

[3] There is here perhaps an allusion to the title of one of Cardan's works, *De Rerum Varietate;* of which Bacon made use in writing the *Sylva Sylvarum.*

meta adhuc ulli quod sciat mortalium posita sit et defixa: Metam autem non aliam esse, quam ut genus humanum novis operibus et potestatibus continuo dotetur.

Cogitavit et illud; inter ista Scientiarum detrimenta, Naturalis philosophiæ sortem præ omnibus minus æquam esse: ut quæ a laboribus hominum leviter occupata, facile deserta, nec majorem in modum culta et subacta sit. Postquam enim fides Christiana adoleverit et recepta sit[1], longe maximam ingeniorum partem ad Theologiam se contulisse, hominumque ex hac parte studio et amplissima præmia proposita et omnis generis adjumenta copiosissime subministrata esse: quin et ævo superiore potissimas Philosophorum commentationes in Morali Philosophia (quæ Ethnicis[2] vice Theologiæ erat) consumptas esse: utrisque autem temporibus summa ingenia haud infrequenti numero ad res civiles se applicasse, præsertim durante magnitudine Romana, quæ ob imperii amplitudinem plurimorum operis indigebat. Eam ipsam vero ætatem qua Naturalis Philosophia apud Græcos maxime florere visa est, fuisse particulam temporis minime diuturnam: ac subinde contradictionibus ac novorum placitorum ambitione corruptam et inutilem redditam. Ab illis autem usque temporibus, neminem prorsus nominari, qui Naturalem Philosophiam ex professo colat, nec ejus inquisitioni immoriatur; adeo ut virum vacuum et integrum hæc Scientia jamdiu non occupaverit; nisi forte quis[3] monachi alicujus in cellula aut nobilis in villula lucubrantis exemplum adduxerit, quod et rarissimum reperietur. Sed factam[4] deinceps instar transitus cujusdam et pontisternii ad alia, magnamque istam Scientiarum matrem in ancillam mutatam esse; quæ Medicinæ aut Mathematicis operibus ministret, aut adolescentium immatura ingenia lavet et imbuat veluti tinctura quadam prima, ut aliam rursus fœlicius et commodius excipiant. Itaque visum est ei Naturalem Philosophiam, incumbentium et paucitate, et festinatione, et tyrocinio, destitutam jacere. Nec ita multo post visum est ei, hoc ad universum doctrinarum statum summopere pertinere. Omnes enim artes et scientias ab hac stirpe revulsas poliri fortassis, aut in usum effingi, sed nil admodum crescere.

Cogitavit et illud; quam molestum ac in omni genere difficilem adversarium nacta sit Philosophia naturalis, Superstí-

[1] *adolevit et recepta est.*—G.
[2] *Ethnicis, magna ex parte.*—G.
[3] *quis forte.*—G.
[4] *factum.*—G.

tionem nimirum et zelum religionis cæcum et immoderatum. Comperit enim ex Græcis nonnullos, qui primum causas naturales fulminis et tempestatum insuetis adhuc hominum auribus proposuerunt, impietatis eo nomine damnatos; nec multo melius exceptos, sed in idem judicium adductos, non capitis sane sed famæ, Cosmographos, qui ex certissimis demonstrationibus, quibus nemo hodie sanus contradixerit, formam terræ rotundam tribuerunt, et ex consequenti Antipodas asseruerunt, accusantibus quibusdam ex antiquis Patribus fidei Christianæ.[1] Quin et duriorem (ut nunc sunt res) conditionem sermonum de Natura effectam ex temeritate Theologorum Scholasticorum et eorum clientelis, qui cum Theologiam (satis pro potestate) in ordinem redegerint et in artis fabricam effinxerint, hoc insuper ausi sunt, ut contentiosam et tumultuariam Aristotelis Philosophiam corpori religionis inseruerint.[2] Eodem spectare etiam, quod hoc sæculo haud alias opiniones[3] magis secundis ventis ferri reperies, quam eorum qui Theologiæ et Philosophiæ, (id est) fidei[4] et sensus, conjugium veluti legitimum multa pompa et solennitate celebrant, et grata rerum varietate animos hominum permulcentes, interim divina et humana inauspicato permiscent. Revera autem si quis diligentius animum advertat, non minus periculi Naturali Philosophiæ ex istiusmodi fallaci et iniquo fœdere, quam ex apertis inimicitiis imminere. Tali enim fœdere et societate, recepta in Philosophia tantum comprehendi: aucta autem, vel addita, vel in melius mutata, etiam severius et pertinacius excludi. Denique versus incrementa, et novas veluti oras et regiones philosophiæ, omnia ex parte religionis pravarum suspicionum et impotentis fastidii plena esse. Alios siquidem simplicius subvereri, ne forte altior in Natura[5] inquisitio ultra datum et concessum sobrietatis terminum penetret; traducentes non recte ea quæ de divinis mysteriis dicuntur, quorum multa sub sigillo divino clausa manent, ad occulta Naturæ, quæ nullo interdicto separantur: Alios callidius conjicere, si media ignorentur, singula ad manum et virgulam divinam (quod Religionis ut putant maxime intersit) facilius referri; quod nil aliud est, quam Deo per mendacium gratificari velle: Alios ab exemplo metuere, ne motus et mutationes Philosophiæ

[1] See Lactantius, Div. Inst. iii. 24.; and for a defence of the conduct of S. Boniface to Virgilius Bishop of Salzburg, who maintained among other positions of doubtful orthodoxy the existence of the antipodes, see Fromondus "De orbe terræ immobili."

[2] *immiscuerint.*—G.

[3] *opiniones et disputationes.*—G.

[4] *fidem* in Gruter. — *J. S.*

[5] *naturam.*—G.

in religionem incurrant et desinant: Alios denique solicitos videri, ne in Naturæ inquisitione aliquid inveniri possit quod Religionem labefactet; quæ duo cogitata incredulitatem quandam sapiunt, et sapientiam animalem: posterius autem absque impietate ne in dubitationem aut suspicionem venire potest. Quare satis constabat ei[1], in hujusmodi opinionibus multum infirmitatis, quin et invidiæ et fermenti non parum subesse. Naturalem enim Philosophiam post verbum Dei certissimam superstitionis medicinam, eandem probatissimum fidei alimentum esse. Itaque merito religioni tanquam fidissimam et acceptissimam ancillam atribui: cum altera voluntatem Dei, altera potestatem manifestet: Neque errasse eum qui dixerit, erratis nescientes scripturas et potestatem Dei[2]; informationem de voluntate, et meditationem de potestate, nexu individuo copulantem. Quæ licet verissima sint, nihilominus illud manet; in potentissimis Naturalis Philosophiæ impedimentis, ea quæ de zelo imperito et superstitione dicta sunt, citra controversiam numerari.

Cogitavit et illud; in moribus et institutis Academiarum, Collegiorum, et similium conventuum, quæ ad doctorum hominum sedes et operas mutuas destinata sunt, omnia progressui Scientiarum in ulterius adversa inveniri. Frequentiam enim multo maximam professoriam primo, ac subinde meritoriam esse: Lectiones autem et exercitia ita disposita, ut aliud a consuetis ne facile cuiquam in mentem veniat cogitare. Sin autem alicui inquisitionis et judicii libertate uti contigerit, is se in magna solitudine versari statim sentiet: Sin et hoc toleraverit, tamen in capessenda fortuna industriam hanc et magnanimitatem sibi non levi impedimento fore experietur. Studia enim hominum in ejusmodi locis in quorundam authorum scripta veluti relegata esse; a quibus si quis dissentiat, aut controversiam moveat, continuo ut homo turbidus et rerum novarum cupidus corripitur; cum tamen (si quis rerum[3] verus æstimator sit) magnum discrimen inter rerum civilium ac artium administrationem reperiet[4]: non enim idem periculum a nova luce ac a novo motu instare; verum in rebus civilibus, motum etiam in melius suspectum esse ob perturbationem; cum civilia authoritate, consensu, fama, opinione, non demonstratione et veritate constent: in artibus autem et scientiis, tanquam in metalli fodinis, omnia novis operibus et ulterioribus progressibus strepere

[1] *ei* om. G.
[2] St. Matth. xxii. 29.
[3] *rerum* om. G.
[4] *reperiatur.*—G.

debere. Atque recta ratione rem se ita habere. In vita autem, visum est ei doctrinarum politiam et administrationem quæ in usu est, scientiarum augmenta et propaginem durissime premere et cohibere.

Cogitavit et illud; etiam in opinione hominum et sensu communi, multa ubique occurrere quæ novas scientiarum accessiones libero aditu prohibeant: maximam enim partem hominum, præsentibus non æquam, in antiquitatem propendere; ac credere si nobis qui nunc vivimus ea sors obvenisset, ut quæ ab antiquis quæsita et inventa sunt primi tentaremus, nos eorum pensa longo intervallo non fuisse æquaturos. Credere similiter, si quis etiam nunc, ingenio suo confisus, inquisitionem de integro suscipere affectet, hunc hujusce rei eventum fore; ut aut in ea[1] ipsa incidat quæ ab antiquitate probata sunt; aut sane in alia, quæ ab antiquitate jampridem judicata et rejecta, in oblivionem merito cessere. Alios, spreta omnino gente et facultate humana utriusque temporis, sive antiqui sive novi, in opinionem labi curiosam et superstitiosam; existimantes scientiarum primordia a spiritibus manasse, et ab eorum dignatione et consortio similiter nova inventa authoramentum habere posse.[2] Alios opinione magis sobria et severa, sed diffidentia graviore, de auctiore scientiarum statu plane desperare, Naturæ obscuritatem, brevitatem vitæ, sensuum fallacias, judicii infirmitatem, et experimentorum difficultates et immensas varietates reputando; itaque hujusmodi spei excessus, quæ majora quam quæ habemus spondeant[3], esse impotentis animi et immaturi; atque læta scilicet principia, media ardua, extrema confusa habere. Nec minorem desperationem præmii quam facti esse. Scientias siquidem in magnis ingeniis proculdubio innasci et augeri; pretia autem et æstimationes Scientiarum, penes populum aut principes viros, aut alios mediocriter doctos esse: unde fieri[4] ut ea tantum inventa vigeant, quæ populari judicio et sensui communi accommodata sunt; ut in Democriti opinione de Atomis usuvenit, quæ quia paulo remotior erat, lusu excipiebatur. Itaque altiores contemplationes Naturæ, quas fere religionis instar duras sensibus hominum accedere necesse est,

[1] *ea* om. G.

[2] Bacon here alludes to the opinions of the cabalists, and perhaps in particular to those of Robert Fludd.

[3] *spondeat.*—G. The reading of the MS. is incorrect; but it may be doubted whether the error be not in the *quæ*, which ought perhaps to be *qui*.

[4] *Itaque non eorundem propositionem scientiarum et judicium esse: unde fieri*, &c. —G.

oriri aliquando posse; sed fere non multo post (nisi evidenti et excellenti utilitate demonstrentur et commendentur, quod hucusque factum non est) opinionum vulgarium ventis agitari et extingui; adeo ut tempus tanquam fluvius, levia et inflata vehere, gravia et solida mergere consueverit. Visum est ei itaque, impedimenta melioris scientiarum status non tantum externa et adventitia, sed et innata et ex ipsis sensibus hausta esse.

Cogitavit et illud; etiam verborum naturam vagam et male terminatam Intellectui hominum illudere, et fere vim facere. Verba enim certe tanquam numismata esse, quæ vulgi imaginem et principatum repræsentent: illa siquidem secundum populares notiones et rerum acceptiones (quæ maxima ex parte erroneæ sunt et confusissimæ) omnia componere et dividere; ut etiam infantes cum loqui discant[1], infœlicem errorum cabalam haurire et imbibere cogantur: Ac licet sapientiores et doctiores se variis artibus ab hac servitute vindicare conentur; nova vocabula fingendo, quod durum, et definitiones interponendo, quod molestum est; nullis tamen viribus jugum excutere posse, quin infinitæ etiam in acutissimis disputationibus controversiæ de verbis moveantur, et quod multo deterius est, istæ ipsæ pravæ verborum signaturæ etiam in mentem radios suos et impressiones reflectant; nec tantum in sermone molestæ, sed etiam Judicio et Intellectui infestæ sunt. Itaque visum est ei, inter internas causas errorum, hanc ipsam ut gravem sane et non[2] innoxiam ponere.

Cogitavit et illud; præter communes scientiarum et doctrinarum difficultates, philosophiam naturalem, præsertim activam et operativam, etiam alia propria habere præjudicia et impedimenta. Non parvam enim existimationis jacturam et fidei fecisse, per quosdam procuratores suos leves et vanos; qui partim ex credulitate partim ex impostura, humanum genus promissis onerarunt; vitæ prolongationem, senectutis retardationem, dolorum levationem, naturalium defectuum reparationem, sensuum deceptiones, affectuum ligationes et incitationes, intellectualium facultatum illuminationes, exaltationes, substantiarum transmutationes, motuum ad libitum multiplicationes, aëris impressiones et alterationes, rerum futurarum divinationes, remotarum repræsentationes, occultarum revelationes, et alia

[1] *discunt.*—G. [2] *non* om. *G.*

complura pollicitando: verum de istis largitoribus, opinari, non multum aberraturum qui istiusmodi judicium fecerit: Tantum nimirum interesse inter horum vanitates et veras artes, in philosophia, quantum intersit inter res gestas[1] Jul. Cæsaris aut Alexandri, et rursus Amadisii ex Gallia aut Arthuri ex Britannia, in historia; constat enim clarissimos illos Imperatores majora revera præstitisse quam umbratiles isti heroës fecisse fingantur; sed modis et viis actionum minime fabulosis et prodigiosis. Itaque æquum non esse fidem veræ memoriæ derogare, quia illa a fabulis quandoque læsa et violata sit: nam Ixionem e nube Centauros; nec ideo minus, Jovem e vera Junone Heben et Vulcanum, virtutes scilicet admirandas et divinas Naturæ et Artis genuisse. Quæ licet vera comperiantur, et homines absque rerum discrimine incredulos esse summæ sit imperitiæ; visum tamen est ei, veritatis aditum per hujusmodi commenta interclusum aut certe arctatum jampridem esse; et vanitatis excessus etiam nunc omnem magnanimitatem destruere.

Cogitavit et illud; reperiri in animo humano inclinationem quandam a Natura insitam, et hominum opinione et disciplina nonnulla corroboratam, quæ naturalis philosophiæ, activæ nimirum et operativæ, progressus remorata sit et averterit. Eam esse opinionem sive æstimationem tumidam et damnosam; Minui nempe Majestatem mentis humanæ, si in experimentis et rebus particularibus, sensui subjectis et in materia terminatis, diu ac multum versetur: præsertim cum hujusmodi res ad inquirendum laboriosæ, ad meditandum ignobiles, ad dicendum asperæ, ad practicam illiberales, numero infinitæ, et subtilitate pusillæ, videri soleant, et ob hujusmodi conditiones gloriæ Artium minus sint accommodatæ. Quam opinionem sive animi dispositionem, vires maximas sumpsisse ex illa altera opinione elata et commentitia, qua veritas humanæ mentis veluti indigena, nec aliunde commigrans; et sensus intellectum magis excitare quam informare asserebatur. Neque tamen errorem hunc, et mentis (si verum nomen quæratur) alienationem, ab iis ulla ex parte correctam, qui sensui debitas, id est primas partes tribuerunt. Quin et hos quoque exemplo et facto suo, relicta prorsus Naturali historia et

[1] So in MS. Gruter's copy has *inter stas Julii*, &c.; the *stas* commencing a new line. Blackbourn silently substituted *pugnas*, which is the common reading and followed by M. Bouillet. Montagu silently substituted *istas*, which could not possibly be right. I had myself substituted *res gestas*, before I knew of the MS.; and it must of course be accepted as the true reading.

mundana perambulatione, omnia in Ingenii agitatione posuisse, et inter opacissima mentis Idola, sub specioso contemplationis [1] nomine, perpetuo volutasse. Quare visum est ei, istud rerum particularium repudium et divortium omnia in familia humana turbasse.

Cogitavit et illud; non tantum ex iis quæ obstant conjecturam capiendam; fieri enim posse ut humani generis fortuna istas difficultates et vincula perfregerit et superaverit: Itaque illud videndum ac penitus introspiciendum, qualis sit ea philosophia quæ recepta sit, aut alia quæpiam ex antiquis, quæ instar tabulæ naufragii ad litora nostra impulsa sit. Atque invenit, Philosophiam Naturalem, quam a Græcis accepimus, pueritiam quandam Scientiæ censeri; atque habere id quod proprium puerorum est, ut ad garriendum prompta, ad generandum inhabilis et immatura sit. Hujus autem philosophiæ jam consensu principem Aristotelem, intacta fere ac illibata Natura, in communibus notionibus, atque earum inter se comparatione, collisione, et reductione inutiliter versatum esse. Neque sane quicquam solidi ab eo sperari, qui etiam mundum e categoriis effecerit: Parum enim interesse, utrum quis materiam formam et privationem, an substantiam qualitatem et relationem, principia rerum posuerit. Verum istis sermonibus supersederi oportere. Nam et justam confutationem instituere (cum neque de principiis, nec de demonstrationum modis conveniat) immemoris esse; et rursus hominem tantam authoritatem et fere Dictaturam in philosophia adeptum per satyram perstringere, levius pro dignitate sermonis instituti, et tamen superbum fore. Illum sane, Dialecticis rationibus, utpote a se (quod ipse licentius gloriatur) oriundis, Naturalem philosophiam corrupisse. Verum ut illum mittamus, Platonem virum sine dubio altioris ingenii fuisse; ut qui et formarum cognitionem ambiret, et inductione per omnia (non ad principia tantum) uteretur: sed inutili utrobique ratione, cum Inductiones vagas, formas abstractas, prensaret et reciperet. Atque hujus philosophi si quis attentius et scripta et mores consideret, eum de Philosophia Naturali non admodum solicitum fuisse reperiet, nisi quatenus ad Philosophi nomen et celebritatem tuendam, vel ad majestatem quandam moralibus et civilibus doctrinis addendam et aspergendam sufficeret. Eundem Naturam non minus Theologia, quam Aristotelem Dialectica

[1] *contemplationis et rationalium.*—G.

inficere: et si verum dicendum est, tam prope ad poëtæ, quam illum[1] ad sophistæ partes accedere. Atque horum placita ex ipsis fontibus haurire licere, cum opera eorum extent. Reliquorum vero, Pythagoræ, Empedoclis, Heracliti, Anaxagoræ, Democriti, Parmenidis, Xenophanis, et aliorum, diversam rationem esse; quod illorum opiniones per internuntios quosdam et famas et fragmenta solummodo habemus[2]; atque idcirco majore inquisitione, ac majore etiam judicii integritate (quæ sortis iniquitatem levet) opus esse. Se tamen cum summa diligentia et[3] cura, omnem de illis opinionibus auram captasse; et[4] quidquid de illis, vel dum ab Aristotele confutantur, vel dum a Cicerone[5] citantur; vel in Plutarchi fasciculo, vel in Laërtii vitis, vel in Lucretii poëmate, vel alicubi in quavis alia sparsa memoria et mentione inveniri possit, evolvisse; et cum fide et judicio librato examinasse. Ac primo sane dubium non esse, quin si opiniones eorum in propriis extarent operibus, majorem firmitudinem habituræ fuissent; cum Theoriarum vires in apta et se mutuo sustinente partium harmonia, et quadam in orbem demonstratione consistant, ideoque per partes traditæ infirmæ sint: quare non contemptim de illis judicium fecisse. Reperisse etiam inter placita tam varia, haud pauca in observatione naturæ et causarum assignatione non indiligenter notata; alios autem in aliis (ut fere fieri solet) fœliciores fuisse. Tantummodo Pythagoræ inventa et placita (licet numeri ejus quiddam physicum innuant) talia majore ex parte fuisse, quæ ad ordinem potius quendam religiosorum fundandum, quam ad scholam in philosophia aperiendam pertinerent; quod et eventus comprobavit; nam eandem disciplinam plus in hæresi Manichæorum, et superstitione Mahumeti, quam apud Philosophos valuisse. Reliquos vero, physicos certe fuisse; atque ex iis nonnullos, qui Aristotele longe et altius et acutius in naturam penetraverint. Atque illum scilicet Ottomanorum more in fratribus trucidandis occupatum fuisse; quod et ei ex voto successit; verum et de Aristotele, et reliquis istis Græcis non dissimile judicium fecit; Esse nimirum hujusmodi placita ac theorias veluti diversa diversarum fabularum in Theatro argumenta, in quandam veri similitudinem, alia elegantius alia negligentius aut crassius conficta; atque habere quod fabularum proprium est, ut veris narrationibus concinniora et commodiora videantur.

[1] *ille.*—G. [2] *habeamus.*—G. [3] *ac.*—G.
[4] *ut.*—G. [5] *a Platone vel Cicerone.*—G.

Neque in istis tantum exhibitis et publicatis theoriis, humani ingenii peregrinationes et errores se sistere aut finire[1] potuisse. Nisi enim mores hominum et affectus et rerum civilium inclinationes hujusmodi novitatibus (etiam in contemplativis) adversæ et infensæ extitissent; dubium minime esse, quin et aliæ multæ in naturali philosophia sectæ introductæ fuissent. Quemadmodum enim in Astronomicis, et iis quibus terram rotari placet, et iis qui per eccentricos et epicyclos motus expediunt, eorum quæ in cœlis sub sensu apparent patrocinia et advocationes æquæ et ancipites sunt; quin et tabularum calculi utrisque respondent; eodem modo et multo etiam facilius esse in Naturali Philosophia complures theorias excogitare, longe inter se ad invicem differentes, sed tamen singulas sibi constantes, et instantiarum vulgarium (quæ in ejusmodi quæstionibus judicia exercere solent) suffragatione abutentes, atque in diversa trahentes. Neque enim defuisse, qui nostra et patrum ætate novas Philosophiæ Naturalis fabricas meditati sunt: Nam Telesium nostra memoria scenam conscendisse, et novam fabulam egisse, magis argumento probabilem quam plausu celebrem[2]: et Fracastorium, non ita pridem, licet novam sectam non elegerit, tamen libertate judicii et inquisitionis honestissime usum esse. Cardanum etiam non minus ausum; sed leviorem. Quin et nuper Gilbertum nostratem, cum naturam Magnetis laboriosissime et magna judicii firmitudine et constantia, necnon experimentorum magno comitatu et fere agmine perscrutatus esset, statim novæ in Philosophia Naturali sectæ imminere cœpisse[3]; nec Xenophanis nomen in ludibrium versum expavisse, in cujus sententiam inclinabat.[4] Hos itaque, et si qui sunt aut erunt horum similes, antiquorum turbæ aggregandos; unam enim eandemque omnium rationem haberi. Esse nimirum homines secundum pauca pronuntiantes, et naturam leviter attingentes, nec ita se illi immiscentes ut aut contemplationum veritatem aut operum utilitatem assequi possint. Credere enim ex tot Philosophiis per tot annorum spatia laboratis[5] et

[1] *finiri.*—G. The last letter has been corrected in the MS.; but whether from *e* into *i* or from *i* into *e* I cannot confidently say.

[2] Telesius is here spoken of more favourably than in the *Temporis Partus Masculus*. The phrase *plausu celebrem* occurs in both passages.

[3] It seems from this that Gilbert's posthumous work, *Physiologia Nova*, published in 1653 by Gruter, but which Bacon had certainly seen in manuscript, was written after the treatise *De Magnete*, published in 1600.

[4] See Vol. II. p. 136, note 1.

[5] *elaboratis.*—G.

cultis, ne unum quidem experimentum adduci posse, quod ad hominum statum levandum aut locupletandum spectet, et hujusmodi speculationibus vere acceptum referri possit. Quin contra Aristotelis de quatuor elementis commentum, cui ipse potius authoritatem quam principium dedit (quod avide a Medicis acceptum, quatuor complexionum, quatuor humorum, et quatuor primarum qualitatum conjugationes post se traxit) tanquam malignum aliquod et infaustum sidus, infinitam et Medicinæ necnon compluribus Mechanicis rebus sterilitatem attulisse; dum homines per hujusmodi concinnitates et compendiosas inceptias sibi satisfieri patientes, nil amplius curant. Quæstionum interim et controversiarum turbas circa hujusmodi Philosophias undique sonare et volitare; adeo ut fabula illa de Scylla in eas ad vivum competere videatur; quæ virginis os et vultum extulit; ad uterum vero monstra latrantia succingebantur et adhærebant: ita habere et istas doctrinas quædam primo aspectu speciosa, sed cum ad partes generationis ventum sit[1], ut fructum ex se edant, tum nil præter lites et inquietas disputationes inveniri, quæ partus vicem obtineant. Atque illud interim notandum, quæ de placitorum rejectione dicta sunt, opinionibus tantum, non ingeniis authorum aut laboribus derogare. Quanto enim quis ingenio et studio maxime valeat, eundem, si naturæ lucem et historiam et rerum particularium evidentiam deserat, tanto magis in obscuriores et magis perplexos phantasiarum et Idolorum recessus et quasi specus se detrudere et involvere. Neque insuper, generales philosophiarum theorias ita[2] argui, ut particulares et inferiorum causarum assignationes, quæ in hujusmodi philosophorum operibus reddi et quæri solent, probentur: verum et has nihilo illis meliores esse; non tantum quod ab illis pendeant, sed quod et ipsæ nullam inquisitionis severitatem[3] præ se ferant; ad paulo notiora et fere obvia deducentes, in quibus mens humana leviter acquiescat et sibi complaceat; verum ad interiora Naturæ minime penetrantes; atque hoc vitii (quod omnium instar est) semper habentes; ut experimenta et effecta jam nota, cohærentia quadam et veluti reticulo connectant, ad eorum quæ nota sunt justam mensuram facto: sed neutiquam causam aliquam aut regulam demonstrent, quæ nova nec prius cognita effecta aut experimenta designet. Atque post has philosophiarum oras peragratas, se undique circumspicientem

[1] *ventum est.*—G. [2] *ita* om. G. [3] *severitatem inquisitionis.*—G.

etiam ad antiquitatis penetralia oculos conjecisse, veluti versus tractum quendam nubilosum et obscurum. Atque scire se, si minus sincera fide agere vellet, non difficile esse hominibus persuadere, apud antiquos sapientes, diu ante Græcorum tempora, Scientiam de Natura majore virtute, sed majore etiam fortasse silentio floruisse: atque ideo solennius fore ea quæ jam afferuntur ad illa referre; ut novi homines solent, qui nobilitatem antiquæ alicujus prosapiæ per Genealogiarum rumores et conjecturas sibi affingunt: sed se, rerum evidentia fretum, omnis imposturæ conditionem recusasse; et qualemcunque ipse opinionem de illis sæculis habeat, tamen ad id quod agitur non plus interesse putare, utrum quæ jam invenientur antiquis cognita et per rerum vicissitudines occidentia et orientia sint, quam hominibus curæ esse debere, utrum Novus Orbis fuerit Insula illa Atlantis et veteri mundo cognita, an nunc primum reperta. Rerum enim Inventionem a Naturæ luce petendam, non ab antiquitatis tenebris repetendam esse. Interea venire alicui in mentem posse, de Chimistarum arte sive philosophia taceri: quod se honoris causa fecisse; quia eam[1] cum illis philosophiis quæ prorsus operum effœtæ sint conjungere noluerit; cum ipsa inventa utilia[2] non pauca exhibuerit et donarit. Verum fabulam illam in hanc artem non male congruere, de sene qui filiis aurum in vinea defossum (nec satis scire quo loco) legaverit; unde illos ad vineam diligenter fodiendam versos esse, et aurum quidem nullum repertum, sed vindemiam ea cultura factam uberiorem. Simili modo et Chimiæ filios, dum aurum (sive vere sive secus) defossum invenire satagunt, movendo et experiendo haud parvo proventui hominibus et utilitati fuisse. Sed illorum inventa non alio modo, nec ratione aliqua meliore, quam artium Mechanicarum, principia et incrementa cepisse[3]; id est, per experientiam meram. Nam philosophiam et speculativam eorum rem minus sanam esse; et illis de quibus locuti jam sumus philosophiarum fabulis duriorem. Utcunque enim Principiorum Trias inventum non inutile fuerit, sed rebus aliqua ex parte finitimum; tamen maxima ex parte, eos paucis distillationum experimentis assuetos, omnia in Philosophia ad separationes et liberationes retulisse, verarum alterationum oblitos. Illam autem opinionis fabricam, qua veluti basi philosophia

[1] *eam* om. G.
[2] *nobilia*, G.
[3] *cœpisse* in MS. and also in Gruter.

corum[1] nititur; nempe esse quatuor rerum matrices sive elementa, in quibus semina et species rerum fœtus suos absolvant, atque hæc quadriformia[2] esse, pro differentia nimirum cujusque elementi; adeo ut in cœlo, aëre, aqua, terra, nil[3] inveniatur, quod non habeat in tribus reliquis conjugatum aliquod et quasi[4] parallelum[5]: huic certe phantasticæ rerum naturalium phalangi peritum Naturæ contemplatorem vix inter somnia sua locum daturum. Neque dissimiles esse rerum harmonias, quæ Naturalis Magiæ cultoribus placuerunt; qui et ipsi per rerum Sympathias et Antipathias omnia expediunt; et ex otiosis et supinissimis conjecturis, rebus virtutes et operationes admirabiles affingunt.[6] Verum et his[7] se parcere; quod inter tot fabulas, tamen opera aliquando exhibent[8]: licet ea fere hujusmodi sint, ut ad admirationem et novitatem, non ad fructum et utilitatem accommodata sint. Sed tamen et novitatis hunc usum plerumque esse; ut sinus naturæ nonnihil excutiat, et luce potius quam[9] actu juvet. Quare visum est ei, neque in Græcorum, neque in novorum hominum placitis, neque in Alchimiæ aut Naturalis Magiæ traditionibus aliquid inveniri, quod ad opes humanas majorem in modum augendas spectet. Itaque hæc omnia vel oblivioni devovenda esse, vel popularibus studiis permittenda, dum veri Scientiarum filii alio cursum dirigant.

Cogitavit et illud; etiam de demonstrationum modis videndum. Demonstrationes enim potentia quadam Philosophiam esse: atque prout illæ aut rectæ aut pravæ sint, inde doctrinas perfectas aut imperfectas sequi probabile esse. Comperit autem, Demonstrationes quæ in usu sunt, nec plenas nec fidas esse. Neque tamen sensibus derogandum, quod quidam fecerunt. Sensuum enim errores in singulis, ad summam Scientiarum non multum facere; quin et ab intellectu fidelius informato corrigi posse. Sed Intellectum ipsum Natura sola fretum, sine arte et disciplina rebus imparem et minorem, sine cunctatione pronuntiandum. Neque enim aut ita capacem esse, ut omnigenam particularium supellectilem ad informationem necessariam recipiat et disponat; neque ita vacuum et purum, ut

[1] *eorum philosophia.*—G.
[2] *quadriforma* in MS.: a transcriber's error no doubt, which Bacon had overlooked.
[3] *nihil.*—G. [4] *quasi* om. G.
[5] See the note 3. p.532.
[6] See the first book of Porta's Natural Magic.
[7] *iis.*—G. [8] *exhibeant.*—G. [9] *luce saltem, si minus actu.*—G.

rerum imagines veras et nativas, absque phantasia et tinctura, admittat. Quin certissimum esse, tum generaliter mentem humanam instar speculi inæqualis esse, quæ rerum radios secundum propriæ sectionis angulos, et non in superficie plana suscipiat et reflectat: tum etiam cuique ex educatione, studiis, et natura sua, vim quandam seductoriam et quasi dæmonem familiarem adesse, qui mentem variis et vanis spectris ludat et turbet. Neque propterea ad opinionem Acatalepsiæ deveniendum. Cuilibet enim manifestum esse, nulla manus constantia, nec oculorum judicio maxime exquisito, lineam rectam vel circulum perfectum describi posse. Attamen admota regula, aut circino circumducto, rem præsto esse. Atque in Mechanicis, manus hominum nudas ad quantula opera sufficere? easdem vi et ope instrumentorum, vastissima quæque ac rursus subtilissima vincere. Sequi igitur, ut ad artem confugiendum, et de demonstratione, quæ per artem regitur, videndum sit. Atque de Syllogismo, qui[1] Aristoteli oraculi loco est, paucis sententiam claudendam. Rem esse nimirum, in doctrinis quæ in opinionibus hominum positæ sunt, veluti moralibus et politicis, utilem et intellectui manum quandam auxiliarem; rerum vero naturalium subtilitati et obscuritati imparem et plane[2] incompetentem. Nam Syllogismum certe ex propositionibus constare, propositiones ex verbis, verba notionum sive animi conceptuum tesseras[3] et signacula esse. Quamobrem notiones ipsæ, quæ verborum animæ sunt, si vagæ, nesciæ, nec satis definitæ fuerint (quod in naturalibus longe maxima ex parte fieri consuevit), omnia ruere. Restare Inductionem, tanquam ultimum et unicum rebus subsidium et perfugium: neque immerito in ea spes sitas esse, ut quæ opera laboriosa et fida rerum suffragia colligere et ad intellectum perferre possit. Verum et hujus nomen tantummodo notum esse; vim et usum homines hactenus latuisse. De Inductione enim ita decernendum. In usu ejus atque etiam forma homines dupliciter peccasse. Primo quod moræ impatientes, et compendia viarum undique lustrantes, et quædam in certo ponere, circa quæ tanquam circa polos disputationes verterentur, properantes; eam tantum ad generalia Scientiarum principia adhibuerunt, media per Syllogismorum derivationes expedire temere sperantes. Rursus, quod de Syllogismo accurate, de hac autem

[1] So Gruter; *quod* in MS. [2] *plane* om. G. [3] *testes.*—G.

demonstratione cursim et negligenter inquirentes, formam ejusdem meditati sunt admodum simplicem et plane puerilem; quæ per enumerationem tantum procedat, atque propterea precario, non necessario concludat. Itaque cum circa demonstrationes talia cogitet, mirum nemini videri posse, si in philosophia naturali sibi cum aliis, sive veteribus sive novis, non conveniat. Neque enim fieri posse (quod ille[1] per jocum dixit) ut idem sentiant, qui aquam et qui vinum bibunt. Illos enim liquorem imbibere crudum, et ex intellectu vel sponte manantem vel industria quadam haustum: se autem liquorem parare et propinare ex infinitis uvis, iisque maturis et tempestivis, et per racemos decerptis et collectis, et subinde in torculari pressis, et in vase repurgatis et clarificatis, constantem; qui tamen ab omni inebriandi qualitate rectificetur, cum nil prorsus phantasiarum vaporibus tribuat aut relinquat. Quare visum est ei, Philosophias illas quas jamdudum diximus, non tantum propter operum sterilitatem, sed etiam propter demonstrationum infirmitatem et fallacias rejici, cum non solum a rebus desertæ, sed et ab auxiliis quæ sibi paraverunt destitutæ ac proditæ sint.

Cogitavit et illud; etiam de inveniendi modis qui in usu sunt, separatim videndum, si modo aliqui sint. In hac enim parte non tam errores et devia, quam solitudinem et vacua inveniri; quod stupore quodam animum perculserit.[2] Non ulli mortalium cordi aut curæ fuisse, ut ingenii et intellectus humani vires ad artes et scientias inveniendas et promovendas dirigeret, eoque viam muniret; sed omnia vel traditionum caligini, vel argumentorum vertigini[3] et turbini, vel casus et experientiæ undis et ambagibus, permissa esse et permitti. Itaque non sine causa fuisse, quod apud Ægyptios (qui rerum inventores more apud antiquitatem recepto consecrare solebant) tot brutorum effigies in templis reperirentur; cum animalia rationis expertia ex æquo fere cum hominibus Naturæ operationum Inventores fuerint. Neque ad hoc homines sua prærogativa hactenus[4] admodum usi sint[5]: sed tamen de iis quæ fiunt, videndum. Et primo de Inveniendi modo simplici et inartificioso, quod hominibus familiare est; id non aliud esse, quam ut is qui se ad inveniendum aliquid comparat et accingitur, primo quæ ab aliis circa illud dicta sint inquirat et evolvat; deinde meditationem pro-

[1] Philocrates of himself and Demosthenes.
[2] *perculerit.*—G.
[3] *vestigiis.*—G.
[4] *hactenus* om. G.
[5] *sunt.*—G.

priam addat. Verum ut quis vel aliorum fidei se committat, vel spiritum suum solicitet et fere invocet ut sibi oracula pandat, rem prorsus sine fundamento esse. Sequi inventionem quæ apud Dialecticos recepta sit. Eam solummodo nomine tenus ad id quod agitur pertinere. Non enim principiorum et axiomatum esse, ex quibus artes constant, sed tantum eorum quæ illis consentanea videntur. Dialecticam enim magis curiosos et importunos et sibi negotium facessentes, ad fidem et veluti sacramentum cuilibet arti præstandum notissimo responso rejicere. Restare experientiam meram; quæ, si occurrit, casus, si quæsita sit, Experimentum nominatur. Atque hanc non aliud quam (quod aiunt) scopas dissolutas esse. Quin et eos qui in aliqua natura vel operatione per multam et erraticam quandam experimentorum variationem revelanda et in lucem educenda sedulo occupati sunt, aut attonitos stare, aut vertiginosos circumire, aliquando gestientes, aliquando confusos, atque semper invenire quod ulterius quærant. Neque prorsus aliter fieri posse. Insciam enim et imperitam valde cogitationem esse, alicujus rei naturam in seipsa perscrutandi. Eandem enim naturam in aliis latentem, in aliis manifestam et quasi palpabilem esse; atque in illis admirationem, in his ne attentionem quidem movere: veluti eam corporum naturam quæ separationi resistit, in aquarum bullis rem sane subtilem et fere ingeniosam videri, quæ hujus rei gratia in pelliculas quasdam in hæmisphærii formam effictas se conjiciunt; eandem in ligno vel lapide non magnopere notari, sed solidi appellatione transmitti. Quare visum est ei, hominibus non tam ignorantiam quam infœlicitatem quandam imputari, cum a curriculo et via per infortunium aut blandimenta deflexerint, non in ejusdem spatiis minus se strenuos præstiterint.

Cogitavit et illud; finem aliquando desperationi, aut saltem querimoniis imponendum: ac illud potius videndum, an omnino cessandum et his [1] quæ habemus utendum sit, an aliquid ut in [2] melius res procedant tentandum et moliendum. Ac primum, finis ipsius et propositi meritum et pretium intueri par esse; ut in materia dura et opere arduo major fiat industriæ accensio. Veniebat autem ei in mentem, antiquis sæculis, Rerum Inventoribus (modum excedente hominum affectu et impetu) divinos honores attributos esse. Iis autem, qui in rebus Civilibus

[1] *iis.*—G. [2] *in* om. G.

merebantur, quales erant Urbium et Imperiorum Conditores, Legislatores, Patriarum a diutinis malis liberatores, Tyrannidum debellatores, et his similes, intra heroum modum honores stetisse. Nec immerito hanc distinctionem priscis illis temporibus invaluisse, cum illorum beneficia ad universum genus humanum, horum ad certas regiones et definitas hominum sedes pertinerent: illa insuper sine vi aut perturbatione humanam vitam bearent; hæc vero non absque tumultu et violentia fere introducta sint. Quod si particularis alicujus inventi utilitas ita homines affecerit, ut eum qui universum genus humanum unico aliquo beneficio complecti posset, homine majorem putarent; at multo celsius inventum esse, quod alia omnia inventa particularia potentia quadam in se contineat, ac animæ humanæ vias aperiat[1], ut ad nova et ulteriora quæque ductu certo et recto penetrare possit. Quemadmodum enim sæculis prioribus, cum homines in navigando per stellarum tantum observationes cursum dirigebant, eos veteris sane continentis oras legisse, aut maria aliqua minora et mediterranea trajecisse; necesse autem fuisse usum acus nauticæ, ut ducem viæ magis fidum, innotuisse, antequam Oceanus trajiceretur, et Novi Orbis regiones detegerentur: simili prorsus ratione, quæ hucusque in artibus et scientiis hominum inventa sunt, potuisse instinctu, usu, observatione, meditatione, aperiri, utpote sensui propiora; antequam vero ad remotiora et occultiora naturæ appellere liceat, necessario præcedere, ut melior et perfectior mentis humanæ usus et adoperatio inveniatur. Quare hujuscemodi Inventum proculdubio Temporis partum nobilissimum, et vere masculum esse. Rursus in Scripturis Sacris notabat, Salomonem Regem, cum imperio, auro, magnificentia operum, satellitio, famulitio, servorum et ministrorum[2] pulcherrima descriptione et ordine, classe insuper, nominis claritudine, et summa hominum admiratione floreret; nil horum tamen sibi gloriæ duxisse; verum ita pronuntiasse: *Gloriam Dei esse rem celare, gloriam Regis autem rem invenire:* non aliter ac si divina natura innocenti et benevolo puerorum ludo delectaretur, qui ideo se abscondunt ut inveniantur; ac animam humanam sibi collusorem in hoc ludo, pro sua in homines indulgentia et bonitate optaverit. Atque hanc inveniendi gloriam eam esse, quæ humanam naturam nobilitet,

[1] *animam humanam carceribus liberet, eique vias aperiat.*—G.
[2] *famulorum.*—G.

nec interim cuiquam mortalium molesta sit (ut Civilia esse solent), nec conscientiam in aliquo remoretur aut mordeat, sed omnino meritum et beneficium sine alicujus pernicie, injuria, aut tristitia deferat: Lucis enim naturam puram et absque maleficio esse; usum ejus perverti; ipsam non pollui. Rursus etiam hominum studia et ambitiones reputans, tria ambitionis genera reperiebat, si modo uni ex iis id nomen imponere fas sit; Primam eorum qui ad propriam potentiam in patriis suis amplificandam magna contentione feruntur; atque hanc vulgarem esse et degenerem: Secundam eorum qui patriæ suæ potentiam inter humanum genus provehere nituntur; quæ sane plus habet dignitatis, cupiditatis minus[1]: Tertiam eorum qui hominis ipsius sive humani generis potentiam et imperium in rerum universitatem instaurare et attollere conantur; quæ reliquis proculdubio et sanior est et augustior: Hominis autem imperium sola scientia constare: tantum enim potest quantum scit: neque ullas vires naturalium causarum catenam perfringere posse; Naturam enim non aliter quam parendo vinci. Cogitabat etiam et animo volvebat, qualia sint, quæ tam de vi simplici et mera inventorum quam de ea[2] quæ cum merito et beneficio conjuncta sit, cogitationem subire possunt. Ac illam quidem non in aliis manifestius occurrere, quam in tribus illis Inventis, quæ et ipsa antiquis incognita, et quorum primordia etiam nobis obscura et ingloria sunt; Artis nimirum Imprimendi, Pulveris Tormentarii, et Acus Nauticæ. Hæc enim tria, numero scilicet pauca ac inventu non multum devia, rerum faciem et statum in orbe terrarum mutasse: primum in re literaria, secundum in re bellica, tertium in re navali; unde infinitas rerum mutationes secutas esse, attentius intuentibus conspicuas; ut non[3] imperium aliquod, non secta, non stella majorem efficaciam et quasi influxum in res humanas habuisse videatur, quam ista mechanica habuerunt. Quod autem ad merita attinet, id optime percipi, si quis consideret quantum intersit inter hominum vitam in excultissima aliqua Europæ provincia, et in regione aliqua novæ Indiæ maxime fera et barbara; tantum sane ut merito hominem homini Deum esse, non solum ex auxilio et beneficio, sed ex status comparatione dici possit. Atque hoc non solum, non cœlum, non corpora,

[1] *haud minus.*—G.
[2] *quæ de virtute ac vi inventorum, tam simplici et mera, tam ea.*—G.
[3] Here a leaf of the MS. has been lost.

sed Artes præstare. At non novum orbem scientiarum et novum orbem terrarum in eo conventuros, ut vetera novis sint longe cultiora. Quin contra necesse esse, accessiones artium iis quæ jam habemus multo se ostendere præstantiores, ut quæ naturam non leviter inflectere, sed vincere et subigere et in imis fundamentis concutere possint; fere enim perpetuo fieri, ut quod inventu sit obvium, id opere sit infirmum; cum radices demum rerum virtute validæ, eædem situ abditæ sint. Si quis autem sit, cui in contemplationis amorem et venerationem effuso, ista operum frequens et cum tanto honore mentio quiddam asperum et ingratum sonet, is pro certo sciat, se propriis desideriis adversari; etenim in natura, opera non tantum vitæ beneficia, sed et veritatis pignora esse. Et quod in religione verissime requiritur, ut fidem quis ex operibus monstret; idem in naturali philosophia competere, ut scientia similiter ex operibus monstretur. Veritatem enim per operum indicationem, magis quam ex argumentatione aut etiam ex sensu, et patefieri et probari. Quare unam eandemque rationem et conditionis humanæ et mentis dotandæ esse. Itaque visum est ei, quæ de finis quem animo metimur et destinamus dignitate dicta sunt, ea non verbis in majus aucta, scd vero minora esse.

Cogitavit et illud; quæ de finis excellentia dicta sunt, posse votis similia videri. Itaque videndum sedulo, quid spei affulgeat, et ex qua parte se ostendat: ac curandum, ne rei optimæ ac pulcherrimæ amore capti, severitatem judicii amittamus aut minuamus. Consentaneum enim esse, prudentiam civilem in hac parte adhibere, quæ ex præscripto diffidit, et de humanis in deterius conjicit. Leviores igitur spei auras rejiciendas: eas autem quæ aliquid firmitudinis habere videntur discutiendas. Atque auguria rite capienti, primo illud occurrebat, hoc quod agitur, ob boni naturam eminentem, manifeste a Deo esse; atque in operibus divinis tenuissima quæque[1] principia eventum trahere. Etiam ex natura temporis bene ominabatur: omnium enim consensu veritatem Temporis filiam esse. Summæ igitur infirmitatis[2] esse, authoribus infinita tribuere, authori autem authorum, atque omnis authoritatis, Tempori, jus suum denegare. Neque solum de Temporis communi jure, sed et de nostræ ætatis prærogativa bene sperabat. Opinionem enim quam homines de Antiquitate fovent negligentem esse, ac vix verbo ipsi

[1] Here we recover the MS. again. [2] *infirmitatis et pusillanimitatis.*—G.

congruam. Antiquitatem enim proprie dici, Mundi ipsius senium, aut ætatem provectiorem. Atque revera consentaneum esse, quemadmodum majorem rerum humanarum notitiam et maturius judicium ab homine sene expetamus quam a juvene, ob experientiam, et eorum quæ vidit et audivit et cogitavit multitudinem: eodem modo, et a nostra ætate (si vires suas nosset, et experiri et intendere vellet) majora quam a priscis temporibus sperari par esse; utpote ætate mundi grandiore, et infinitis experimentis et observationibus cumulata et aucta. Neque pro nihilo æstimandum, quod per longinquas illas navigationes et peregrinationes quæ nostra ætate increbuerunt, plurima in natura patuerunt quæ novam philosophiæ lucem affundere possint. Quin et turpe hominibus esse, si Globi Materialis tractus, terrarum videlicet, marium, astrorum, nostris temporibus in immensum aperti et illustrati sint; Globi autem Intellectualis fines intra veterum inventa et angustias steterint. Etiam Temporum conditionem in Europa, civilium rerum respectu non alienam esse; aucta Anglia, pacata Gallia, lassata Hispania[1], immota Italia et Germania: Itaque libratis regum maximorum potentiis, et inconcusso[2] nationum nobilissimarum statu, res ad pacem, quæ Scientiis instar tempestatis serenæ et benignæ est, inclinare. Neque ipsum rei literariæ statum hisce temporibus incommodum esse: sed et quandam opportunitatem præ se ferre; tum ob Imprimendi artem, antiquis incognitam, cujus beneficio singulorum inventa et cogitata fulguris modo transcurrere queant; tum ob religionis controversias, quarum tædio fortasse homines ad Dei potestatem, sapientiam, et bonitatem in operibus suis contemplandum facilius animum adjicere possint. Si quis autem sit, qui consensu et temporis diuturnitate in veterum placitis moveatur, is si in res acutius introspiciat, ductores admodum paucos, reliquos sectatores tantum et plane[3] numerum esse reperiet; homines nimirum, qui ab ignorantia ad præjudicium transierunt, neque in verum consensum (qui interposito judicio fit) unquam coïerunt. Atque ipsam temporis diuturnitatem recte consideranti in angustias parvas redigi. Nam ex viginti quinque annorum centuriis, in quibus memoria hominum fere versatur, vix quinque centurias

[1] The *Cogitata et Visa* was written in 1607, only two years before the struggle between Spain and the United Provinces was terminated by the Great Truce. It is to this contest that the epithet *lassata* apparently refers.

[2] *incusso.*—G.

[3] *plane* om. G.

seponi, quæ scientiarum proventui utiles et feraces fuerint; easque ipsas longe maxima ex parte aliis scientiis, non illa de natura, satas et cultas fuisse. Tres enim doctrinarum revolutiones et periodos numerari: unam apud Græcos; alteram apud Romanos; ultimam apud occidentales Europæ nationes: reliqua mundi tempora bellis et aliis studiis occupata, et quoad scientiarum segetem sterilia et vasta inveniri. Atque de tempore sic cogitabat. Etiam ex casus vi et natura hujusmodi divinationem sumpsit. Casum nimirum proculdubio multis Inventis principium dedisse, sumpta ex natura rerum occasione. Nam[1] ideo in ignis invento Prometheum novæ Indiæ ab Europæo dissensisse, quod apud eos silicis non est copia. Itaque in his quæ præsto sunt, casum largius inventa exhibere; in iis quæ ab usu quotidiano semota sunt, parcius; sed utcunque, omnibus sæculis parturire et parere. Neque enim causam videri, cur casus consenuisse putetur, aut effœtus jam factus. Igitur ita cogitabat, si hominibus non quærentibus et aliud agentibus multa inventa occurrant, nemini sane dubium esse posse, quin eisdem quærentibus, idque via et ordine, non impetu et desultorie, longe plura detegi necesse sit. Licet enim semel aut iterum accidere possit, ut quispiam in id forte fortuna incidat quod magno conatu scrutantem antea fugit, tamen in summa rerum proculdubio contrarium inveniri. Casum enim operari raro, et sero, et sparsim ; Artem contra constanter, et compendio, et turmatim. Etiam ex inventis ipsis quæ jam in lucem prodita sunt, de iis quæ adhuc latent conjecturam rectissime capi putabat. Eorum autem nonnulla ejus esse generis, ut antequam invenirentur haud facile cuiquam in mentem venisset de iis aliquid suspicari. Solere enim homines de novis rebus ad exemplum veterum, et ad phantasiam ex iis præceptam hariolari: quod opinandi genus fallacissimum est; quandoquidem ea quæ ex rerum fontibus petuntur, per rivulos consuetos non utique fluunt. Veluti si quis, ante tormentorum igneorum inventionem, rem per effectus descripsisset, atque ita dixisset, Inventum quoddam detectum esse, per quod muri et munitiones quæque maximæ ex longo intervallo quaterentur et dejicerentur; homines sane de viribus tormentorum et machinarum per pondera et rotas et similia multiplicandis, multa et varia commen-

[1] *Num.*—G. This was no doubt a mere misprint; but modern editors have turned it into a false reading, by inserting after *copia* a note of interrogation, which is not found in Gruter.

taturos fuisse; de vento autem igneo vix unquam imaginationem aliquam occursuram fuisse; ut cujus exemplum non vidissent, nisi forte in terræ motu aut fulmine, quæ ut non imitabilia rejecissent. Eodem modo si ante fili bombycini inventionem quispiam hujusmodi sermonem injecisset: Esse quoddam fili genus ad vestium et supellectilis usum, quod filum lineum aut laneum longe tenuitate ac nihilominus tenacitate ac etiam splendore et mollitie excelleret, homines statim aut de serico aliquo vegetabili, aut de alicujus animalis pilis delicatioribus, aut de avium plumis et lanugine, aliquid opinaturos fuisse; de vermis autem alicujus textura, eaque tam copiosa et anniversaria, nil cogitaturos: quod si quis etiam de vermi verbum aliquod emisisset, ludibrio certe futurum fuisse; ut qui novas aranearum operas somniaret. Quare eandem et eorum quæ in sinu naturæ adhuc recondita sunt magna ex parte rationem esse, ut hominum imaginationes et commentationes fugiant et fallant. Itaque sic cogitabat; si cujus spem de novis inventis cohibeat, quod sumpta ex his quæ præsto sunt conjectura, ea aut impossibilia aut minus verisimilia putet; eum scire debere se non satis doctum ne ad optandum quidem commode et apposite esse. Sed rursus cogitabat, esse ex jam inventis alia diversæ et fere contrariæ naturæ, quæ fidem faciant, posse genus humanum nobilia inventa etiam ante pedes posita præterire et transmittere. Utcunque enim pulveris tormentarii, vel fili bombycini, vel acus nauticæ, vel sacchari, vel vitri [1], vel similium inventa occultis (ut existimantur) rerum proprietatibus [2] niti videantur; Imprimendi certe artem nihil habere, quod non sit apertum et fere obvium, et ex antea notis conflatum. Solere autem mentem humanam, in hoc inventionis curriculo, tam lævam et male compositam esse, ut in nonnullis primo diffidat, et non multo post se contemnat: atque primo incredibile videri, aliquid tale inveniri posse; postquam autem inventum sit, rursus incredibile videri, id homines tam diu fugere potuisse. Atque hoc ipsum quoque ad spem trahebat, superesse nimirum adhuc magnum inventorum cumulum, qui non solum ex operationibus incognitis eruendis, sed et ex jam cognitis transferendis et applicandis deduci possit. Etiam illa auspicia ut bona et læta accepit, quæ in artibus Mechanicis observavit, atque eorum successu, præsertim ad philosophiam comparato.

[1] *vel vitri* om. G.

[2] *vel similia inventa quibusdam rerum et naturæ proprietatibus.*—G.

Artes enim Mechanicas, ut auræ cujusdam vitalis participes, quotidie crescere et perfici; Philosophiam vero statuæ more adorari et celebrari, nec moveri. Atque illas in primis authoribus rudes et fere informes ac onerosas se ostendere: postea novas vires et commoditates adipisci. Hanc autem in primo quoque authore maxime vigere, ac deinceps declinare. Neque aliam hujus contrarii successus causam veriorem esse, quam quod in Mechanicis multorum ingenia in unum coëunt; in Philosophia autem, singulorum ingenia ab uno quopiam destruuntur. Nam postquam deditii facti sunt, amplitudinem non addere; sed in uno ornando aut stipando servili officio occupari. Quare omnem philosophiam ab experientiæ radicibus ex quibus primum pullulavit et incrementum cepit avulsam, rem mortuam esse. Atque hac cogitatione arrectus, etiam illud notavit; facultates Artium et Scientiarum aut Empiricas, aut Rationales sive Philosophicas, omnium consensu esse: has autem geminas [1] se non bene adhuc commistas [2] et copulatas videre. Empiricos enim formicæ more congerere tantum et uti; Rationales autem aranearum more telas ex se conficere. Apis vero rationem mediam esse, quæ materiam ex floribus tam horti quam agri eliciat, sed eam etiam propria facultate vertat et digerat. Neque absimile veræ Philosophiæ opificium esse; quæ ex Historia naturali et mechanicis experimentis præbitam materiam, non in memoria integram, sed in intellectu mutatam et subactam reponit. Neque se nescire, esse ex Empiricorum numero, qui se non mere Empiricos haberi volunt; et ex Dogmaticis, qui se in experientia industrios et perspicaces videri ambiunt: verum hæc fuisse et esse quorundam hominum artificia, existimationem quandam, ut alteruter in sua secta excellere videatur, captantium. Revera autem harum facultatum divortia et fere odia, semper valuisse. Quare ex arctiore earum et sanctiore fœdere omnia fausta et fœlicia portendi putabat. Etiam illud libenter vidit: Intuebatur nempe infinitas ingenii, temporis, facultatum expensas, quas homines in rebus et studiis (si quis vere judicet) inutilibus collocant; quarum pars quota si ad sana et solida verteretur, nullam non difficultatem superare posset. Neque esse quod homines particularium multitudinem reformident, cum Artium phænomena manipuli instar sint, ad ingenii commenta semel ab

[1] *geminas* om. G. Nor was this word in the MS. originally: it is inserted between the lines in Bacon's hand.

[2] *commissas.* — G.

evidentia rerum disjuncta et distracta. Atque hæc quæ dicta sunt singula, impulsum quendam ad spem faciendam habere. Ante omnia autem certissimam spem esse, ex præteriti temporis erroribus; atque (quod [1] quispiam de civili statu non prudenter administrato dixit) *quod ad præterita spectando pessimum, id* [2] *ad futura optimum esse.* Cessantibus enim hujusmodi erroribus (ad quod ipsa monita primum gradum præstant) maximam rerum conversionem fore. Quod si homines per tanta annorum spatia viam tenuissent, nec tamen ulterius progredi potuissent, ne spem quidem ullam subesse potuisse. Tunc enim manifestum fuisse, difficultatem in materia et subjecto (quæ nostræ potestatis non sunt), non instrumento (quod penes nos est); hoc est, in rebus ipsis earumque obscuritate, non in animo humano et ejus adoperatione esse. Nunc autem apparere, viam non aliqua mole aut strue imperviam, sed ab humanis vestigiis deviam esse: itaque solitudinis metum paulisper offundere, nec ultra minari. Postremo et illud statuit, si spei multo imbecillior et obscurior aura ab isto novo continente spiraverit, tamen experiundum fuisse. Non enim pari periculo rem non tentari, et non succedere: cum in illo ingentis boni, in hoc pusillæ humanæ operæ jactura vertatur. Verum ex [3] dictis et non dictis visum est ei, spei abunde esse, non tantum homini industrio ad experiendum, sed etiam prudenti et sobrio ad credendum.

Cogitavit et illud; studio accenso et spe facta, de modis perficiendi videndum esse. Hæc itaque sunt, quæ ei circa hoc generaliter visa sunt; quæ etiam nudis et apertis sententiis clauderc et complecti consentaneum putavit. Visum est ei, plane ab iis quæ jam facta sunt diversa facienda; itaque rerum præteritarum redargutionem ad futura vice oraculi fungi. Visum est ei, theorias et opiniones et notiones communes, quantum rigore mentis et constantia obtineri potest, penitus aboleri; et Intellectum planum et æquum ad particularia de integro accedere: ut fere non alius ad regnum naturæ, quam ad regnum cœlorum, pateat aditus; ad quod nemini nisi sub persona Infantis ingredi liceat. Visum est ei, particularium sylvam et materiem, et numero et genere et certitudine aut subtilitate ad informationem sufficientem, colligi et congeri, tum ex naturali historia, tum ex experimentis mechanicis; atque ex his [4] potissimum, quia natura plenius se prodit cum ab arte tenetur et urgetur, quam in libertate pro-

[1] *quod etiam.*—G. [2] *id ipsum.*—G. [3] *et.*—G. [4] *iis.*—G.

pria. Visum est ei, eandem materiam ea ratione in Tabulas atque in ordinem redigi et digeri, ut Intellectus in eam agere, atque opus suum exequi possit; cum nec verbum divinum in rerum massam absque ordine operatum sit. Visum est ei[1], a particularibus in Tabulas relatis, ad novorum particularium inquisitionem minime confestim transeundum (quod tamen et ipsum res utilis sit, et instar experientiæ cujusdam literatæ), sed ad generales et communes comprehensiones prius ascendendum.[2] Visum est ei, Intellectus motum et impetum naturalem, sed pravum, a particularibus ad comprehensiones supremas et generalissimas[3] (qualia sunt principia quæ vocant[4]) saliendi[5], omnino cohibendum: sed comprehensiones proximas primo, ac deinceps medias, eliciendas et inveniendas, atque per gradus continuos et scalam veram procedendum.[6] Visum est ei, talem inductionis formam inveniendam[7], quæ ex aliquibus generaliter concludat; ita ut instantiam contradictoriam inveniri non posse demonstretur.[8] Visum est ei, eam tantum comprehensionem probari et recipi, quæ non ad mensuram facta sit et aptata particularium ex quibus elicitur, sed amplior aut latior sit; eamque amplitudinem sive latitudinem suam ex novorum particularium designatione, quasi fidejussione quadam, firmet.[9] Visum est ei, multa præter hæc inveniri, quæ non tam ad perfectionem rei, quam ad operis compendium, ac etiam ad messem humanam inde accelerandam, insigniter faciant. Quæ omnia utrum recte cogitata sint an secus, ab opinionibus (si opus sit) provocandum, et effectis standum.

Cogitavit et illud; rem quam agit, non opinionem, sed opus esse; eamque non sectæ alicujus aut placiti, sed utilitatis et amplitudinis immensæ fundamenta jacere. Itaque de re non modo perficienda, sed et communicanda et tradenda (qua par

[1] *ei* om. G.

[2] *procedendum, et naturali sane intellectus processui eatenus indulgendum. Sed simul visum est,* &c.—G.

[3] *superiores et magis generales.*—G.

[4] *principia quæ vocant artium et rerum.*—G.

[5] *saliendi, et reliqua descendendo per media expediendi.*—G.

[6] *adscendendum: fere enim contemplationum et intellectus vias in Bivium illud moralium, antiquis decantatum, coincidere: Alteram enim viam primo ingressu planam ad avia ducere, alteram a principio arduam et suspensam in plana desinere.*—G.

[7] *introduci.*—G.

[8] *ne forte secundum pauciora quam par est, et ex iis quæ præsto sunt pronuntiemus, et (quod unus ex antiquis dixit) scientiam in mundis propriis et non in mundo communi quæramus.*—G.

[9] *ne vel in jam notis hæreamus, vel laxiore fortasse complexu umbras et formas abstractas prensemus.*—G.

est cura) cogitationem suspiciendam esse. Reperit autem homines in rerum scientia quam sibi videntur adepti, interdum proferenda, interdum occultanda, famæ et ostentationi servire: quin et eos potissimum qui minus solida proponunt, solere ea quæ afferunt obscura et ambigua luce venditare, ut facilius vanitati suæ velificare possint. Putare autem, se id tractare quod ambitione aliqua aut affectatione polluere minime dignum sit: sed tamen necessario eo decurrendum esse (nisi forte rerum et animorum valde imperitus esset, et non explorato[1] viam inire vellet) ut satis meminerit, inveteratos semper errores, tanquam phreneticorum deliramenta, arte et ingenio subverti, vi et contentione efferari. Itaque prudentia ac morigeratione quadam utendum (quanta cum simplicitate et candore conjungi potest), ut contradictiones ante extinguantur quam excitentur. Ad hunc finem parare se de naturæ interpretatione atque de natura ipsa opus[2], quod errores minima asperitate destruere, et ad hominum sensus non turbide accedere possit; quod et facilius fore, quod se non pro duce gesturus, sed ex natura ipsa lucem præbiturus et sparsurus sit, ut duce postea non sit opus. Sed cum tempus interea fugiat, et ipse rebus civilibus plus quam vellet immistus esset, id longum videri: præsertim cum incerta vitæ cogitaret, et aliquid in tuto collocare festinaret. Venit ei itaque in mentem, posse aliquid simplicius proponi, quod in vulgus non editum, saltem tamen ad rei tam salutaris abortum arcendum satis[3] esse possit. Atque diu et acriter rem cogitanti et perpendenti, ante omnia visum est ei, Tabulas Inveniendi, sive legitimæ Inquisitionis formulas[4] in aliquibus subjectis, proponi tanquam ad exemplum, et operis descriptionem fere visibilem. Neque enim aliud quicquam reperiri, quod aut vera viæ aut errorum devia in clariore luce ponere, aut ea quæ afferuntur nihil minus quam verba esse evidentius demonstrare possit: neque etiam quod magis fugiendum esset ab homine qui aut rei diffideret aut eam in magis accipi aut celebrari cuperet.[5] Tabulis autem propositis et visis, non ambigere quin timidiora ingenia subitura sit quædam hæsitatio et fere desperatio de

[1] *prorsus inexplorato.*—G.
[2] *parare se de natura opus.*—G.
[3] *satis fortasse.*—G.
[4] *hoc est materiem particularium ad opus intellectus ordinatam.*—G.
[5] The passage which follows, down to *edatur*, is not in Gruter's copy; and the next sentence runs thus: *Fieri autem posse ut si destinata perficere non detur, ut sunt humana tamen ingenia firmiora et sublimiora, etiam absque majoribus auxiliis, ab oblatis monita, reliqua ex se et sperare et potiri possint.*

similibus Tabulis in aliis materiis sive subjectis conficiendis; atque ita sibi in exemplo gratulaturos ut etiam præcepta desiderent. Plurimorum autem studia ad usum Tabularum supremum et ultimum, et clavem ipsam interpretationis poscendam arrecta fore: ac multo ardentius ad novam faciem naturæ saltem aliqua ex parte visendam, quæ per hujusmodi clavem resignata sit et in conspectum data. Verum sibi in animo esse, nec proprio nec aliorum desiderio servienti, sed rei conceptæ consulenti, Tabulis cum aliquibus communicatis, reliqua cohibere, donec tractatus qui ad populum pertinet edatur. Et tamen animo providere, ingenia firmiora et sublimiora, etiam absque majoribus auxiliis, ab oblatis monitos[1], reliqua ex se et speraturos et potituros esse. Fere enim se in ea esse opinione, nempe (quod quispiam dixit) prudentibus hæc satis fore, imprudentibus autem ne plura quidem. Se nihilominus de cogitatis nil intermissurum. Quod autem ad tabulas ipsas attinet, visum est[2] nimis abruptum esse ut ab ipsis docendi initium sumatur. Itaque idonea quædam præfari oportuisse; quod et jam se fecisse arbitratur, nec universa quæ hucusque dicta sunt alio tendere.[3] Hoc insuper velle homines non latere, nullis inveniendi formulis (more nunc apud homines et artes recepto) necessitatem imponere; sed certe omnibus pertentatis, ex multo usu et nonnullo ut putat judicio, eam quam probavit et exhibuit inquirendi formulam verissimam atque utilissimam esse. Nec tamen se officere quominus ii qui otio magis abundant, aut a difficultatibus quas primo experientem sequi necesse est liberi jam erunt, aut majoris etiam et altioris sunt ingenii, rem in potius perducant; nam et ipsum statuere, artem inveniendi proculdubio cum inventis adolescere. Ad extremum autem visum est ei, si quid in his quæ dicta sunt aut dicentur boni inveniatur, id tanquam adipem sacrificii Deo dicari, et hominibus, ad Dei similitudinem, sano affectu et charitate hominum bonum procurantibus.

[1] So MS.

[2] *visum est autem.*—G. The words from *Se nihilominus* to *attinet* being omitted.

[3] The passage which follows, down to *adolescere*, is not in Gruter's copy; and the last sentence begins *Postremo visum est ei.*

FILUM LABYRINTHI;

SIVE

INQUISITIO LEGITIMA DE MOTU.

PREFACE

TO THE

INQUISITIO LEGITIMA DE MOTU.

By the last paragraph of the *Cogitata et Visa* we learn that that work was intended for a preface to certain "Tables of Discovery, or Formulæ of Legitimate Investigation," which were to be set forth in a few subjects as a specimen of the work in hand. *Ante omnia visum est ei Tabulas Inveniendi sive legitimæ inquisitionis formulas, hoc est materiem particularium ad opus intellectus ordinatam, in aliquibus subjectis proponi, tanquam ad exemplum et operis descriptionem fere visibilem.*

In the *Commentarius Solutus* (July 26. 1608), among other memoranda relating to the progress of the work, I find the following: "The finishing the 3 Tables, De Motu, De Calore et Frigore, De Sono."

Now in Gruter's volume, among the Impetus Philosophici, I find a Latin fragment entitled *Filum Labyrinthi, sive Inquisitio legitima de Motu;* in Stephens's second collection, I find an English piece entitled *Sequela chartarum, sive Inquisitio legitima de Calore et Frigore;* in Rawley's Opuscula I find a Latin fragment entitled *Historia et Inquisitio prima, de Sono et auditu, et de forma Soni, et latente processu Soni; sive Sylva Soni et auditus.*

Of these, the first is merely a skeleton of an enquiry, the titles of the several *chartæ* being given in order, but the titles only; the second is a rough collection of materials for that enquiry *de forma Calidi,* which was afterwards selected as the example to illustrate the method by, in the second book of the *Novum Organum;* both have evidently been intended as specimens of the *materies particularium ad opus intellectus ordinata,* and there can be little doubt that they belong properly to this period and place. The third is a collection of the *materies particularium,* set out without any indication of a

tabular arrangement, and may perhaps have been drawn up in its present shape about the same time with those portions of the natural history which belong to the third part of the Instauration, and to which in form it bears a greater resemblance. But in the absence of all evidence from which the date of composition can be inferred, the reference in the *Commentarius Solutus* induces me to place it here.

The preface, entitled *Franciscus Bacon Lectori*, stands in Gruter's volume immediately before the *Filum Labyrinthi*, and probably belongs to it.

The selection of *Motion* as the first subject to which the new method was to be applied and the example by which it was to be illustrated, strikes me as very characteristic both of the aspiring genius of Bacon's philosophy and of the error of judgment which lay at the bottom of it. He saw that all the active operations of nature were modes of motion, and concluded that if we could thoroughly understand the nature of motion, we should at once have the key to her secret processes, and therewithal the command over her powers; which was the true end and aim of knowledge. The subtlety and intricacy of the phenomena did not daunt him; for the true *method* was as the clue of the Labyrinth, which patiently and faithfully followed out must inevitably lead at last to the central principle which explains and reconciles them all. How far he proceeded in the enterprise, we may partly learn from the *Commentarius Solutus*, which contains the commencement of an elaborate and methodical investigation into the nature of motion; with what success, we may partly infer from the second book of the *Novum Organum*, in which the description of the different kinds of motion is introduced merely as a part of the doctrine of the prerogatives of instances: the fact probably being that he had despaired of arriving by the *Filum Labyrinthi* at any tangible result within any assignable time.

The investigation, as set down in the *Commentarius* on the 26th and 27th of July, 1608, is carried out a little further than in this fragment; and as it belongs naturally to this place, and will throw some additional light upon the nature of the process as Bacon at this time conceived it, as well as upon the names by which some of its stages are distinguished, I cannot better conclude this preface than by quoting it *in extenso*.

J. S.

Inquisitio Legitima.

Sectio ordinis.		Nov. op.	1. Carta electionis et præoptionis.
			2. Sylva, sive Carta Mater.
			3. Meta posita, sive Carta terminans.
			4. Loci, sive Carta Articulorum.
			5. Vena exterior, sive Carta divisionis primæ.
Ap. sæ.[1]			6. Carta assignationis vel collocationis.
Sectio rerum.	7.		1. Carta Historiæ ordinatæ ad divisiones primas et reliquos articulos.
	8.		2. Carta Amanuensis, sive super Instantias.
Sectio lucis.	9.		1. Carta Analysis motus compositi, vel de spelling.
	10.		2. Vena interior, sive Carta divisionis secundæ.
	11.		3. Carta observationis, sive axiomatis.
	12.		4. Carta humana optativa.
	13.		5. Carta humana activa, sive practica.
	14.		6. Carta Anticipationis, sive interpretationis sylvestris.
	15.		7. Carta Indicationis, sive ad cartas novellas.

Nota Interpretationem legitimam non fieri, nec clavem Interpretationis adoperari usque ad reordinationes et cartas novellas finitas, ut duæ sint machinæ Intellectus, una Inferior quam descripsimus, altera Superior quæ est novellarum.[2]

Inquisitio Legitima de Motu.

Cart. electionis.

Quieta rerum principia sermones spectant; moventia autem et motus ipse, opera.

Motuum genera bene discreta et descripta, Protei vincula.

[1] Probably *apparentiæ secundæ*.

[2] This is the last of many memoranda which appear to have been transferred from an old note-book (transportata ex commentario vetere) on the 26th of July, 1608. The next page is headed *Transportat. Jul.* 27. 1608, — the beginning of the next morning's work.

Meta posita.

Quod animo metimur; Motus; exacte inspicienti non alius quam localis; sensibilis scilicet et minutus.

Etiam quies comprehendatur; ex natura propria aut per accidens, ex libratione vel cohibitione motus.[1]

Tria motuum genera imperceptibilia, ob tarditatem, ut in digito horologii; ob minutias, ut liquor seu aqua corrumpitur aut congelatur &c.; ob tenuitatem, ut omnifaria aëris, venti, spiritus, quæ non cernuntur ac subtiliores eorum motus nullo sensu comprehenduntur, sed tantum per pensa et effectus.

Motus et naturas per globos non distinguimus ut alia sit ratio cœlestium, alia sublunarium: popularis ratio ista videtur et infirma; nam etiam cœlestia mutantur in magnis, ut patet in cometis coordinatis situ suo cum stellis fixis: In parvis si mutantur tamen sensum nostrum latent; Nam quæ etiam in superficie terræ fiunt mutationes de circulo Lunæ, si oculus ibi positus esset, discerni nequirent; Rursus eadem æternitas et motus regularitas terræ competit; Nam in profunditate terræ par æternitas ac in cœlo, et videntur variationes et mutationes et turbæ tantum in confiniis regnorum istorum fieri; scilicet in superficie et crusta terræ, et superficie et confiniis cœli, et aëris regione media quam vocant; Etiam fluxus maris tam regularis est quam motus lunæ.

De motu autem animali, et de eo motu qui ad sensum peragendum requiritur, non inquirimus, sed eum sui juris facimus et emancipamus ut seorsim et principaliter inquiratur.

Motus autem animales quatenus ad cohibitionem et participationem manifestam motuum cæterorum comprehendimus, ut saltum, sanguinis per venas ascensionem, etc.

Motus autem impressionis sive signaturæ quæ incorporeæ sunt tamen ob spatiorum sive locorum Mutationes comprehendimus, ut in sonis, visibilibus, attractionibus sive coitionibus; calorem tamen et frigus omnino emancipamus ob dignitatem et multiplicem usum, et de illis seorsim et principaliter inquiri volumus.

Nec motum generationis vitalis expedimus, sive assimilationem magnam, sed et hunc emancipamus.

[1] Opposite this paragraph is written *qu.*

Carta Articulorum.

First to enquire the several kinds or diversities of motion.

Then what bodies or subjects are susceptible of every kind and what not, and what have them in strength and what more obscurely, and what have them more familiarly and what more rarely.

Then the comparisons of the forces of every motion, and which is predominant one over the other, and which is absolute and never falsified, if any such be; and how they evade and shift each nature of motion to do his part.[1]

Nodi et globi motuum, and how they concur and how they succeed and interchange in things most frequent.

The times and moments wherein motions work, and which is the more swift and which the more slow, and where they take their beginnings and where they leave.

The convenience or disconvenience which motion hath with heat and tenuity, and how these three meet, sever, and vary.

The power in motions corporal of agitation, fire, time.[2]

The effects of motion, and what qualities it induceth *respectivè* to every motion.

The force of union in motions, and the analogy thereof.[3]

Carta divisionis primæ, sive ad apparentiam primam.

Agitatio, sive Motus absque termino, sive Motus se exercens.

Latio, sive Motus ad terminum, sive Motus itinerans.

Agitationis species duæ: Agitatio placida; Agitatio inquieta.

Agitatio placida, sive Motus conversionis, sive *Curulis.*

Agitatio inquieta duplex: Agitatio relevationis et tentationis; Agitatio trepidationis.

[1] The last clause added in the margin.

[2] In the margin of the MS., opposite the last four paragraphs, are the following notes; written apparently at another time, and without any special reference to the particular paragraphs against which they happen to stand. They are written consecutively, one under the other, with strokes of the pen between to separate them. "The instruments and efficients.— Subjectum quasi efficiens generale, efficiens tanquam subjectum proximum. — Periodi et processus motuum. — Spatia orbis virtutis."

[3] This last article appears to have been added at another time.

Lationis species duæ: Latio manifesta, sive Motus localis; Latio occulta sive Motus corporalis.

Motus localis tres sunt species: Motus respectu spatiorum; Motus respectu situs partium; Motus respectu alterius.

Motus respectu spatiorum habet 4 species.

Motus nexus, sive ne detur Vacuum.

Motus plagæ, sive mechanicus, sive ne fiat penetratio dimensionum.

Motus libertatis, sive ad] sphæram veterem, sive ad convenientiam; qui est duplex: Motus a violenta condensatione ad convenientiam raritatis; et Motus a violenta rarefactione ad convenientiam densitatis.

Motus hyles migrantis, sive ad sphæram novam; qui etiam est duplex: Motus hyles migrantis ad sphæram novam majorem; Motus hyles migrantis ad sphæram novam minorem.

Motus respectu situs partium est simplex, et est motus congruitatis sive disponens.

Motus respectu alterius habet 4 species.

Motus ad massam, sive congregationis major, sive Panegyricus sive fœderis generalis.

Motus Amicitiæ, sive congregationis minor; sive sympathiæ, sive fœderis sanctioris.

Motus disgregationis major, sive fugæ.

Motus disgregationis minor, sive Antipathiæ.

Motus corporalis habet species sequentes, numero 17.

Motus subsistentiæ, sive ne detur nihilum.

Motus integritatis, sive ne admittatur corpus externum; sive amplexus veteris.

Motus cohibitionis, sive regius, sive *ne admittatur nova forma.*

[Isti 3 motus pertinent ad conservationem in statu.[1]]

Motus maturationis; sive exaltationis et perfectionis naturæ suæ, sive in potius.

[Iste motus tendit ad perfectionem.[1]]

[1] Added in margin.

Motus contractionis, sive hyles minorans interius, sive restrictionis.

Motus relaxationis sive hyles majorans exterius, sive fusionis.

Motus separationis in se, sive factionis, sive congregans homogenea et disgregans heterogenea, sive unionis per partes.

[Isti 4 motus præsupponunt manentiam corporis in toto, absque jactura et emissione, licet mistura et ordinatio partium mutetur.[1]]

Motus separationis in aliud, sive exilii, sive exituræ aut emissionis.

Motus separationis altæ et magnæ, sive anarchiæ, sive putrefactionis, sive separationis in partes[2], sive radicalis.

[Isti 3[3] motus pertinent ad separationem.]

Motus applicationis et resistentiæ secundum fibras, sive texturam et ordinem earum.

Motus tenacitatis, sive adhærentiæ, sive primi tactus aut amplexus novi.

Motus receptionis in se, sive mistionis, sive incorporationis, sive indentatus, sive unionis per totum.

[Isti tres motus pertinent ad corporum applicationes.]

Motus generationis Jovialis, sive assimilationis, sive generationis similis sui fixæ et manentis.

Motus generationis Saturniæ, sive signaturæ aut impressionis, sive generationis similis sui momentaneæ vel transeuntis.

Motus generationis fictæ, sive excitationis et imitationis.

[Isti 3 motus pertinent ad propagationem speciei.]

Motus metamorphoseos placidæ, sive novæ formæ procedentis absque dissolutione.

Motus metamorphoseos destruentis, sive novæ formæ a corruptione, sive reordinationis et triumviratus, sive rudimenta generationis vitalis.

[Isti 2 motus sunt mutationis majoris.]

[1] Added in margin. [2] I am sure that I read this word right. [3] Sic.

Carta assignationis.

Fractionem corporum, sive resistentiam contra fractionem et separationem, assignamus sub motu Integritatis.

Modum tamen fractionis in nonnullis aut prohibitionis fractionis in quo situs partium valet, assignamus sub motu applicationis primo.

Reductionem ad statum quo, as when urine or blood is broken and by fire reduced, assignamus sub motu cohibitionis vel regio.

Conservationem, mansionem in statu, non exituram spiritus in corporibus porosis sive terræ fixis (?) assignamus sub motu regio.

All ripenings, coction, assation, the gathering perfection of wines, beers, cyders, &c. by age and time, assignamus sub motu maturationis.[1]

Etiam multiplicationem virtutis per unionem quantitatis, vel conservationem status per unionem quantitatis, assignamus sub motu maturationis vel exaltationis.

Liquefactionem, Mollificationem, Liquiditatem, consistentiam, duritiem, indurationem, or closeness of parts, Ampliationem, congelationem, constipationem, assignamus sub motu hyles interiore.

Residence, flowering, working out a skin, defecation, refining, clearing and lees, dissolving or breaking as in blood or urine, coagulation or turning to curds or whey, hæc assignamus sub motu separationis in se.

[Etiam disordinationem partium, as when pears rolled get a sweetness, when roses crushed alter their smell, hæc assignamus motui separationis in se.]

Evaporationem, exhalationem, emissionem, consumptionem, diminutionem, arefactionem, assignamus sub motu separationis in aliud.

Corruptionem, rust, mould, assignamus motui separationis altæ.

Motus soliditatis sive expulsionis corporis dissimilis, et attractionem similis, assignamus sub motu mistionis.

[1] The reference is to the three kinds of pepsis spoken of by Aristotle: pepansis, epsesis, and optesis. Meteorol. iv. —*R. L. E.*

Exuctionem, depastionem, deprædationem, intumescentiam, intenerationem, augmentationem, sive vegetatione seu accretione, assignamus motui generationis Jovis.

Fermentationem et infectionem assignamus generationi fictæ.

Destillationem, sublimationem, assignamus motui metamorphoseos placidæ.

Turning into worms, flies, &c., assignamus motui triumviratus.[1]

[1] Here a line is drawn across the page, and a different subject is entered upon, with a new pen and fresh fingers. The next page is headed *Transportata Jul.* 28. 1608. It would seem therefore that this concluded the day's work of Wednesday the 27th of July.

FRANCISCUS BACON LECTORI.

Si qui fuerint qui in veterum placitis sibi acquiescendum non putarunt, quod aliquando ab animi constantia, sæpius ab ingenii levitate fieri vidimus; ii qualescunque fuerint, hac fere defensione communi usi sunt; se, licet ab antiquitate desciverint, tamen ea afferre quæ cum sensu optime conveniant; atque homines, si hoc sibi in animum inducere possint ut authoritate non perstringantur sed sibi ipsi et sensibus credant, facile in eorum partes transituros. Nos vero sensum nec contradictione violavimus nec abstractione destruimus, et materiam ei longe uberiorem quam alii præbuimus, et multo ministerio errores ejus restituimus, potestates auximus, atque judicium ejus, damnatis phantasiis atque in ordinem redacta ratione, munivimus et firmavimus; ut alii professione quadam, nos reipsa sensum tueri videamur, atque philosophia nostra una fere atque eadem res sit cum sensu restituto et liberato. Neque propterea tamen nobis de hominum fide et assensu large pollicemur, cum nostra ratio cum nulla priorum consentiat, sed plane in diversum trahat. Nam qui hucusque, pertæsi eorum quæ veteres afferunt, ad experientiam et sensum tanquam de integro se contulerunt, in hunc modum fere se gesserunt; ut nonnulla primo secundum sensum acriter et strenue inquisiverint, ea potissimum sumentes quæ illis maxime rationem totius habere visa sunt; atque ex his confestim experientiæ manipulis, et tanquam factionibus, placita confinxerint; anguste et inæqualiter philosophati, et omnia paucis condonantes. Atque iste tamen modus philosophandi ad fidem faciendam sæpenumero validus et felix est, ob angustias pectoris humani, quod illis quæ una et subito mentem subire possunt maxime movetur, et acquiescendi cupidum cætera vel negligit, vel modo quodam non perceptibili ita se habere putat ut illa pauca quibus phantasia impleri aut inflari consuevit. At contra, nos non manipulares, sed justum divinorum operum

exercitum post nos trahentes, et ex æquo et secundum summas rerum pronunciantes, non habemus fere quo nos vertamus, aut ex qua parte aditum ad humanam fidem reperiamus; cum ea quæ adducimus altius quam notiones, latius quam hujusmodi experimenta, se extendant. Itaque necesse est ut ex illis pleraque præproperis et propensis sensuum prehensionibus non satisfaciant, nonnulla autem dura et instar religionis incredibilia ad sensus accedant. Sensus enim humani fallunt utique, sed tamen etiam se indicant; verum errores præsto, indicia accersita sunt. Itaque et novam prorsus tradendi viam ingressi sumus, rei ipsi convenientem: non disputando, aut exempla rara et sparsa adducendo; cum uterque fidei faciendæ modus fortasse adversus nobis futurus fuisset, quorum decreta nec in cura[1] notionum, nec in angustiis experientiæ abscissæ et truncatæ, fundata sint: sed experientiam coacervatam et continuam adhibuimus, atque homines ad fontes rerum adduximus, ac universum intellectus processum et derivationes sub oculos posuimus. Quare quicunque eo animo sunt, ut aut argumentis nitantur, aut paucis exemplis cedant, aut authoritatibus impediantur, aut opus hoc nostrum evolvere et introspicere propter aut animi aut temporis angustias non possint; cum illis nos profecto de hac re nec serio colloqui possumus. Satis fuerit si illud Philocratis de Demosthene dictum huc transferimus: *Atque nolite mirari, Athenienses, si mihi cum Demosthene non conveniat. Ille enim aquam, ego vinum bibo.* Illi enim certe liquorem bibunt crudum, ex intellectu vel sponte manantem vel industria quadam haustum. Nos autem liquorem paramus et propinamus ex infinitis uvis confectum, iisque maturis et tempestivis, et per racemos decerptis et collectis, et subinde torculari pressis, et rursus in vase se separantibus et clarificatis. Ne enim hoc Deus siverit, ut phantasiæ nostræ somnium pro exemplari mundi edamus; sed potius benigne faveat, ut apocalypsin et visionem vestigiorum et viarum Creatoris in Natura et Creaturis conscribamus.

[1] So in the original: a misprint, I suspect, for *aura*.

FILUM LABYRINTHI,

SIVE

INQUISITIO LEGITIMA DE MOTU.

MACHINA Intellectus inferior: seu sequela chartarum ad apparentiam primam.

Racemi sive Charta Historiæ ordinatæ ad Articulum Primum:

De Formis et Differentiis Motus.

Motus Applicationis Exterioris, sive motus adherentiæ.

Motus Applicationis Interioris, sive motus mixturæ.

Motus Applicationis ad Fibras, sive motus identitatis.

Motus Assimilationis, seu motus generationis Jovis.

Motus Signaturæ, sive motus generationis Saturni.

Motus Excitationis, sive motus generationis fictæ.

Racemi sive Charta Historiæ ordinatæ ad Articulum Secundum:

De Subjectis sive Continentibus Motum.

Racemi sive Charta Historiæ ordinatæ ad Articulum Tertium:

De Vehiculis sive Deferentibus Motum.

Racemi sive Charta Historiæ ordinatæ ad Articulum Quartum:

De Operationibus et Consequentiis Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Quintum:

De Curriculis sive Clepsydris Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Sextum:

De Orbe Virtutis Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Septimum:

De Hierarchia Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Octavum:

De Societatibus Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Nonum:

De Affinitatibus Motus.

Racemi sive Charta Historiæ ordinatæ ad Articulum Decimum:

De viribus Unionis in Motu.

Racemi sive Charta Historiæ ordinatæ ad Articulum Undecimum:

De viribus Consuetudinis et Novitatis in Motu.

Racemi sive Charta Historiæ ordinatæ ad Articulum Duodecimum:

De aliis omnibus Motus.[1]

Syllabæ, sive Charta Anatomiæ.

Vena relicta, seu Charta Divisionis Secundæ.

Axioma Exterius, sive Charta Observationis.

Columnæ, sive Charta Impossibilis Apparentis, sive Humana Optativa.

Fœnus, sive Charta Usus Intervenientis sive Humana Activa.

Anticipatio, sive Charta Interpretationis Sylvestris.

Pons, sive Charta ad Chartas Novellas.

Machina Intellectus Superior; sive sequela Chartarum ad Apparentiam Secundam.

Chartæ Novellæ.

Atque exemplum Inquisitionis de Natura (ut videre est) absolvimus, idque in subjecto omnium maxime capaci et diffuso; eaque forma, quam judicamus cum veritate et intellectu summum consensum habere. Neque tamen more apud homines recepto formulæ alicui necessitatem imponimus, tanquam unica esset, et instar artis ipsius. Sed certe omnibus pertentatis, ex longo usu et nonnullo, ut putamus, judicio, hanc ipsam formam sive rationem disponendi materiam rerum ad opus intellectus, ut probatam et electam exhibemus. Nihil autem officit, quominus ii qui otio magis abundant, aut a difficultatibus quas primo experientem sequi necesse est liberi jam erunt, aut majoris etiam et altioris sunt ingenii, rem in potius perducant. Nam et ipsi statuimus, artem inveniendi adolescere cum inventis; neque ad

[1] So in the original.

aliquid immotum et inviolabile inveniendi artificium hominum industriam et felicitatem astringendam. Artis enim perfectionem artis usum remorari, nihil est necesse. Quod autem viam novam scientiam docendi et tradendi ingressi sumus, quod doctrinam et præcepta quasi prætereuntes et aliud agentes distulimus, atque in exemplo præcipue elaboravimus; hoc summa ratione nos fecisse arbitramur. Neque sane homines latere volumus, quid in hac re secuti simus: nam obtinere in hominum æquitate positum est, vel potius in fortuna communi: res enim humani generis agitur, non nostra. Primum hoc videmur adepti, quod maximum est, ut plane intelligamur. Longe enim aliud est singulis præceptis exempla subnectere, aliud universi operis figuram perfectam et quasi solidam construere et repræsentare. Etenim in mathematicis, adstante machina aut fabrica sequitur demonstratio facilis et perspicua: sed absque hac commoditate omnia videntur involuta, et quam revera sunt subtiliora. Atque etiam illud usuvenit, ut quo grandius instrumentum demonstrationis fiat, eo sit et fidelius et illustrius. Etiam putamus nos aliquem modestiæ et simplicitatis fructum percipere posse, quod nec vim nec insidias hominum judiciis fecimus aut paravimus, sed rem nudam et apertam exhibuimus. Nemo [1] enim ante nos, homines ad fontes naturæ et res ipsas adduxerunt, ut in medium consulerent; sed exempla et experientiam ad dictorum suorum fidem, non ad alieni judicii libertatem adhibuerunt: ut dupliciter nos de humano genere meritos existimemus, duas res maxime mortalibus caras et gratas, potestatem et libertatem, simul deferentes: potestatem operum, libertatem judicii. Ac veluti in judiciis civilibus ea maxime incorrupta et recta sunt ubi minimum oratorum licentiæ et turbis, aut etiam eloquentiæ, conceditur; sed omnis fere opera et tempus in testibus consumitur; eodem modo et de natura judicia exercentur optima, cum nec pugnaci nec probabili orationi aut disputationi maximæ partes tribuuntur, sed experientiæ testimoniis evidentibus et coacervatis res conficitur. Nam certe in authorum testimoniis libido et stimulus versatur: rerum autem testimonia et responsa, interdum obscura et perplexa, sed semper sincera et incorrupta sunt. Liberati etiam videmur magno malo, ex hominum fastidio et præjudicio. Solent enim viri prudentes et graves et cunctatores novitatem

[1] So in the original. Perhaps Bacon had altered *nulli* into *nemo* and forgot to alter the plural verbs at the same time into the singular.

omnem levitatis et vanitatis nomine suspectam habere; novas autem sectas et nova placita ut larvas et umbras aspernari. Neque enim multum interesse putant, utrum homines in theoriis consentiant aut dissentiant: nisi quod vetera et recepta magis sint, ob consensum et mores, rebus gerendis accommodata. Huic malo non aliud remedium reperiebatur, nisi ut amplitudine exempli, in ipsos hominum sensus ita incurramus, ut primo aspectu quivis mediocris judicii rem solidam et sobriam esse, atque opera et utilitatem spirantem, et a novæ scholæ aut novæ sectæ ratione et consuetudine prorsus alienam, statim perspiciat et agnoscat. Speramus etiam hoc potissimum modo antiquis et aliis qui in philosophia aliquid opinati sunt, authoritatem et fidem abrogari, honorem et reverentiam conservari posse; idque non artificio quodam, sed ex vi ipsa rei. Existimamus enim subituram animos hominum cogitationem, num et illi hujusmodi diligentiam adhibuerint, aut placita et opiniones suas a tali fundamento excitaverint. Atque sane hoc dubium alicui videri potuisset, si opiniones eorum tantum ad nos pervenissent, modus autem inquisitionis et demonstrationis non apparuisset. Tum enim tale quippiam in mentem nobis venisset cogitare, illos proculdubio a meditationum suarum principio magnam vim et copiam exemplorum paravisse, eamque simili quo nos ordine, vel fortasse meliore disposuisse; sed postquam re comperta illis pronuntiare visum esset, tum demum pronuntiata et eorum explicationes et connexiones in scripta redegisse, addito sparsim uno aut altero exemplo ad docendi lumen; sed primordia illa et notas ac veluti codicillos et commentarios suos in lucem edere, et supervacuum et molestum putasse; itaque fecisse ut in ædificando facere decet: nam post operis ipsius structuram, machinas et scalas et hujusmodi instrumenta a conspectu amovenda esse. Verum hæc de ipsis cogitare, nobis per ipsos integrum non est: formam enim et rationem suam inquirendi, et ipsi profitentur[1], et scripta eorum ejusdem expressam imaginem præ se ferunt. Ea non alia fuit, quam ut ab exemplis quibusdam quibus sensus plurimum assueverat, ad conclusiones maxime generales sive principia scientiarum advolarent: ad quorum immotam veritatem, conclusiones inferiores per media derivarent: ex quibus arte constituta, tum demum si qua controversia de aliquo exemplo mota esset, quod placitis

[1] This passage and the corresponding one in the *Redargutio Philosophiarum* (p. 582.) serve to correct the reading *profitemur* in the *Nov. Org.* i. 125. — *R. L. E.*

suis refragari videretur, illud per distinctiones aut regularum suarum explanationes in ordinem redigerent: aut si de rerum particularium causis mentio injiceretur, eas ad speculationes suas ingeniose accommodarent. Itaque res et totius erroris processus prorsus patet: nam et missio experientiæ præpropera fuit, et conclusiones mediæ (quæ operum vitæ sunt) aut neglectæ aut infirmo fundamento impositæ sunt; et sensui ipsi (qui non repræsentatur) ingenii quædam facta est substitutio illegitima et infelix; et si qua frequens alicubi inter eorum scripta inveniatur exemplorum et particularium mentio, id sero, et postquam jam decretum esset de placitis suis, factum esse constat. Nostra autem ratio huic maxime contraria est: quod Tabulæ affatim extra controversiam ponunt. Quibus positis et illud sequitur, admirationem quæ quibusdam ex antiquis aut alii cuipiam tribuitur, intactam et imminutam manere. Nam in iis quæ in ingenio et meditatione posita sunt, illi mirabiles homines se præstiterunt. Nostra autem talia sunt, quæ hominum ingenia et facultates fere æquant. Nam quemadmodum ad hoc, ut linea recta[1] describatur, plurimum est in manus et visus facultate, si per constantiam manus et oculorum judicium tantum res tentatur; sin per regulam admotam, non multum; aut ut etiam simplicius verba faciamus, quemadmodum ad hoc ut longa oratio recitetur memoriter, homo memoria pollens ab homine oblivioso mirum in modum differt; sin de scripto, non item: eadem ratione et in contemplatione rerum quæ mentis viribus solum incumbit, homo homini præstat vel maxime; in ea autem quæ per Tabulas fit et earum usum rite adhibitum, non multo major in hominum intellectu eminet inæqualitas, quam in sensu inesse solet. Quin et ab ingeniorum acumine et agilitate, dum suo motu feruntur, periculum metuimus. Itaque hominum ingeniis non plumas aut alas, sed plumbum et pondera addimus. Accedit et illud, quod rem omnium difficillimam (si vis et contentio adhibeatur) per Tabulas nostras sponte secuturam non diffidimus; hanc ipsam, ut postquam homines, primo aditu fortasse difficiles et alieni, paulo post nativæ rerum subtilitati quæ oculis suis subjicitur et differentiis in experientia plane signatis et expressis assueverint, continuo fere subtilitatem verborum et disputationum, quæ hucusque hominum cogitationes occupavit et tenuit, quasi pro re ludicra et quadam incantatione et spectro habituri sint; atque de natura decreturi, quod de fortuna dici

[1] *recte* in the original.

solet, eam a fronte capillatam, ab occipitio calvam esse; omnem enim istam seram et præposteram subtilitatem, postquam tempus rerum præterierit, naturam prensare et captare, sed nunquam apprehendere et capere posse. Etiam vivum nos et plane animatum docendi genus adhibuisse arbitramur. Non enim scientiam a stirpibus avulsam, sed cum radicibus integris tradimus, ut in ingeniis melioribus velut in gleba feraciore transplantata, magnum et felix incrementum recipere possit. Nos autem, si qua in re vel male credidimus, vel obdormivimus et minus attendimus, vel defecimus et inquisitionem abrupimus, nihilominus rem ita proposuimus, ut et errores nostri, antequam massam scientiæ altius inficiant, notari et separari possint: atque etiam ut facilis et expedita sit laborum nostrorum successio et continuatio: tum autem homines vires suas noscent, cum non eadem infiniti sed omissa alii præstabunt. Etiam illud ludibrium avertisse videmur, cui frequens nostra operum mentio et inculcatio exponi posset, nisi homines inter res ipsas versari coëgissemus; hoc est, ut homines opera quæ ab aliis exigimus, et a nobis poscerent: facile enim quivis jam perspiciet, non frustra nos de operibus sermonem intulisse, cum in Tabulis ipsis paucas nec novorum operum designationes et fœnora reperiet, atque simul rationem nostram plane perspiciet, non opera ex operibus (scilicet ut empirici solent), sed ex operibus causas, ex causis rursus opera nova[1], ut legitimi naturæ interpretes, educendi; atque propterea evitandi præmaturam et effusam a principio ad opera deflexionem, atque hujus rei legitimum et præstitutum tempus observandi et expectandi. Postremo et illud videmur effecisse, ut homines non solum de vi et instituto hujus instaurationis nostræ, sed etiam de mole et quantitate ejus veras opiniones habeant; ne forte alicui in mentem venire possit, hoc quod molimur vastum quiddam esse et supra humanas vires; cum contra plerumque fiat, ut quod magis utile magis finitum sit: Hæc vero de natura inquisitio, vel[2] singulis non sit pervia, conjunctis vero operis etiam expedita. Quod ut pateat magis, digestum Tabularum addere visum est. Primæ Tabulæ sunt de motu; secundæ de calore et frigore; tertiæ[3], de radiis rerum et impressionibus ad distans; quartæ, de vegetatione et vitis; quintæ, de passionibus corporis animalis; sextæ, de sensu et objectis; septimæ, de affectibus ani-

[1] *nota* in the original.
[2] So in the original. I suspect that several words have been left out.
[3] *terræ* in the original.

mi; octavæ, de mente et ejus facultatibus. Atque hæ Tabulæ ad naturæ separationem pertinent, et sunt ex parte formæ. Ad constructionem autem naturæ pertinent, et ex parte materiæ sunt, Tabulæ quæ sequuntur. Nonæ, de architectura mundi; decimæ, de relativis magnis, sive accidentibus essentiæ; undecimæ, de corporum consistentiis, sive inæqualitate partium; duodecimæ, de speciebus sive rerum fabricis et societatibus ordinariis: decimæ tertiæ, de relativis parvis, sive proprietatibus; ut universa inquisitio per Tredecim Tabulas absolvatur. Minores autem Tabulas (quas specilla appellamus) ex occasione et usu præsenti conficimus. Neque enim in illis ipsis ullam nisi per Tabulas et de scripto inquisitionem recipimus. Restat pars altera mole minor, vi potior; ut postquam constructionem machinæ docuimus, etiam de usu machinæ lucem et consilia præbeamus.

CALOR ET FRIGUS.

PREFACE

TO THE

CALOR ET FRIGUS.

THE following fragment, which was first printed by Stephens from a MS. in Bacon's own hand, then belonging to the Earl of Oxford, and now in the British Museum (Harl. 6855.), is here reprinted from the original. By the general title *Sequela Cartarum*, and the heading [1] *Sectio ordinis*, &c., it appears to have been designed for the commencement of a methodical enquiry; but it breaks off at so early a stage that no new light can be gathered from it; and the plan upon which Bacon at this time proposed to proceed in these investigations he afterwards materially altered. For the final shape which his speculations concerning Heat and Cold took, see the second book of the *Novum Organum*.

J. S.

[1] This heading is carefully and fairly written out in Bacon's Roman hand at the top of every page; not in a single line, as it is here printed, but thus:—

Calor et Frigus
Sectio ordinis
Carta Suggestionis.

SEQUELA CARTARUM;

SIVE

INQUISITIO LEGITIMA DE CALORE ET FRIGORE.

Sectio Ordinis.

Carta Suggestionis, sive Memoria Fixa.

THE sun-beams hot[1] to sense.

The moon-beams not hot[2], but rather conceived to have a quality of cold, for that the greatest colds are noted to be about the full, and the greatest heats about the change.[3] *Qu.*

The beams of the stars have no sensible heat by themselves; but are conceived to have an augmentative heat of the sun-beams by the instances following.

The same climate arctic and antarctic are observed to differ in cold, vt. that the antarctic is the more cold, and it is manifest the antarctic hemisphere is thinner planted of stars.

The heats observed to be greater in July than in June; at which time the sun is nearest the greatest fixed stars,

[1] Spelt *whott* in MS., and so throughout.

[2] Compare on this point Vol. I. pp. 239. and 624. Since Mr. Ellis's notes on those passages were in type, a more decisive experiment appears to have been made as to the calorific property of the moon's rays. In Mr. C. Piazzi Smyth's "Notes of Proceedings during the Astronomical Expedition to Teneriffe," date 14 Oct. 1856, I find the following paragraph: —"Happier was the enquiry into the radiation of the moon, by means of the Admiralty delicate thermomultiplier, lent by Mr. Gassiot. The position of the moon was by no means favourable, being, on the night of the full, 19 deg. south of the equator; but the air was perfectly calm, and the rare atmosphere so favourable to radiation, that a very sensible amount of heat was found, both on this and the following night. The absolute amount was small, being about one-third of that radiated by a candle at a distance of 15 feet; but the perfect capacity of the instrument to measure smaller quantities still, and the confirmatory result of groups of several hundred observations, leave no doubt of the fact of our having been able to measure here a quantity which is so small as to be altogether inappreciable at lower altitudes."

[3] The last clause is omitted in the *Novum Organum*.

vt. Cor Leonis, Cauda Leonis, Spica Virginis, Sirius, Canicula.

The conjunction of any two of the three highest planets noted to cause great heats.

Comets conceived by some to be as well causes as effects of heat, much more the stars.

The sun-beams have greater heat when they are more perpendicular than when they are more oblique: as appeareth in difference of regions, and the differences of the times of summer and winter in the same region; and chiefly in the difference of the hours of mid-day, morning, evening in the same day.

The heats more extreme in July and August than in May or June; commonly imputed to the stay and continuance of heat.

The heats more extreme under the tropics than under the line; commonly imputed to the stay and continuance of heat, because the sun there doth as it were double a cape.

The heats more about three or four of clock than at noon; commonly imputed to the stay and continuance of heat.

The sun noted to be hotter when it shineth forth between clouds, than when the sky is open and serene.

The middle region of the air hath manifest effects of cold, notwithstanding locally it be nearer the sun; commonly imputed to antiperistasis, assuming that the beams of the sun are hot either by approach or by reflexion, and that falleth in the middle term between both; or if, as some conceive, it be only by reflexion, then the cold of that region resteth chiefly upon distance. The instances shewing the cold of that region are, the snows which descend, the hails which descend, and the snows and extreme colds which are upon high mountains.

But *qu.* of such mountains as adjoin to sandy vales, and not to fruitful vales, which minister no vapours; or of mountains above the region of vapours, as is reported of Olympus, where any inscription upon the ashes of the altar remained untouched of wind or dew. And note it is also reported that men carried up sponges with vinegar to thicken their breath, the air growing too fine for respiration, which seemeth not to stand with coldness.

The clouds make a mitigation of the heat of the sun. So

doth the interposition of any body, which we term shades; but yet the nights in summer are many times as hot to the feeling of men's bodies as the days are within doors, where the beams of the sun actually beat not.[1]

There is no other nature of heat known from the celestial bodies or from the air, but that which cometh by the sun-beams. For in the countries near the pole, we see the extreme colds even in the summer months, as in the voyage of Nova Zembla, where they could not disengage their barque from the ice, no not in July, and met with great mountains of ice some floating some fixed, at that time of the year, being the heart of summer.

The caves under the earth noted to be warmer in winter than in summer, and so the waters that spring from within the earth.

Great quantity of sulphur, and sometimes naturally burning after the manner of Ætna, in Iceland; the like written of Gronland, and divers other the cold countries.[2]

The trees in the cold countries are such as are fuller of rosin, pitch, tar, which are matters apt for fire, and the woods themselves more combustible than those in much hotter countries; as, for example, fir, pineapple, juniper: *Qu.* whether their trees of the same kind that ours are, as oak and ash, bear not, in the more cold countries, a wood more brittle and ready to take fire than the same kinds with us?

The sun-beams heat manifestly by reflexion, as in countries pent in with hills, upon walls or buildings, upon pavements, upon gravel more than earth, upon arable more than grass, upon rivers if they be not very open, &c.

The uniting or collection of the sun-beams multiplieth heat, as in burning-glasses, which are made thinner[3] in the middle than on the sides (as I take it contrary to spectacles); and the operation of them is, as I remember, first to place them between the sun and the body to be fired, and then to draw them upward towards the sun, which it is true maketh the angle of

[1] The following note is inserted here in the margin:—No doubt but infinite power of the heat of the sun in cold countries, though it be not to the analogy of men, and fruits, &c.

[2] Opposite to this and to the nine preceding paragraphs, is written in the margin *Aug.*

[3] So MS. Compare Vol. I. p. 241. (where the error is avoided, though not corrected) and p. 253, note 1.

the cone sharper. But then I take it if the glass had been first placed at the same distance to which it is after drawn, it would not have had that force. And yet that had been all one to the sharpness of the angle. *Qu.*

So in that the sun's beams are hotter perpendicularly than obliquely, it may be imputed to the union of the beams, which in case of perpendicularity reflect into the very same lines with the direct; and the further from perpendicularity the more obtuse the angle, and the greater distance between the direct beam and the reflected beam.

The sun-beams raise vapours out of the earth, and when they withdraw they fall back in dews.

The sun-beams do many times scatter the mists which are in the mornings.

The sun-beams cause the divers returns of the herbs, plants, and fruits of the earth; for we see in lemon-trees and the like, that there is coming on at once fruit ripe, fruit unripe, and blossoms; which may shew that the plant worketh to put forth continually, were it not for the variations of the accesses and recesses of the sun which call forth and put back.

The excessive heat of the sun doth wither and destroy vegetables, as well as the cold doth nip and blast them.

The heat or beams of the sun doth take away the smell of flowers, specially such as are of a milder odour.

The beams of the sun do disclose some flowers, as the pimpernel, marigold, and almost all flowers else, for they close commonly morning and evening or in over-cast weather, and open in the brightness of the sun; which is but imputed to dryness and moisture which doth make the beams heavy or erect, and not to any other propriety in the sun-beams. So they report not only a closing but a bending or inclining in the *heliotropium* and *calendula*. *Qu.*

The sun-beams do ripen all fruits, and addeth to them a sweetness or fatness, and yet some sultry hot days overcast are noted to ripen more than bright days.

The sun-beams are thought to mend distilled waters, the glasses being well stopped, and to make them more virtuous and fragrant.

The sun-beams do turn wine into vinegar; but *quæ.* whether they would not sweeten verjuice?

The sun-beams doth pall any wine or beer that is set in them.

The sun-beams do take away the lustre of any silks or arras.

There is almost no mine but lieth some depth in the earth; gold is conceived to lie highest and in the hottest countries; yet Thracia and Hungary are cold, and the hills of Scotland have yielded gold, but in small grains or quantity.

If you set a root of a tree too deep in the ground that root will perish, and the stock will put forth a new root nearer the superficies of the earth.

Some trees and plants prosper best in the shade, as the bayes, strawberries, some wood-flowers.

Almost all flies love the sun-beams, so do snakes; toads and worms contrary.

The sun-beams tanneth the skin of man; and in some places turneth it to black.

The sun-beams are hardly endured by many, but cause headach, faintness, and with many they cause rheums, yet to aged men they are comfortable.

The sun causes pestilences which with us rage about autumn, but it is reported in Barbary they break up about June and rage most in the winter.

The heat of the sun and of fire and living creatures agree in some things which pertain to vivification; as the back of a chimney will set forward an apricock-tree as well as the sun; the fire will raise a dead butterfly as well as the sun and so will the heat of a living creature; the heat of the sun in sand will hatch an egg: *qu.*

The heat of the sun in the hottest countries nothing so violent as that of fire, no not scarcely so hot to the sense as that of a living creature.

The sun a fountain of light as well as heat. The other celestial bodies manifest in light, and yet *non constat* whether all borrowed as in the moon [1], but obscure in heat.

The southern and western wind with us is the warmest, whereof the one bloweth from the sun the other from the sea, the northern and eastern the more cold; *qu.* whether in the coast of Florida or at Brasil the east wind be not the warmest

[1] The words *and yet . . . . moon* are interlined in the MS.

and the west the coldest, and so beyond the antarctic tropic the southern wind the coldest.

The air useth to be extreme hot before thunders.

The sea and air ambient appeareth to be hotter than that at land; for in the northern voyages two or three degrees farther at the open sea they find less ice than two or three degrees more south near land: but *qu.* for that may be by reason of the shores and shallows.

The snows dissolve fastest upon the sea-coasts yet the winds are counted the bitterest from the sea, and such as trees will bend from. *Qu.*

The streams or clouds of brightness which appear in the firmament, being such through which the stars may be seen, and shoot not but rest, are signs of heat.

The pillars of light which are seen upright and do commonly shoot and vary are signs of cold, but both these are signs of drought.

The air when it is moved is to the sense colder, as in winds, fannings, *ventilabra.*

The air in things fibrous, as fleeces, furs, &c. warm, and those stuffs to the feeling warm.

The water to man's body seemeth colder than the air, and so in summer in swimming it seemeth at the first going in; and yet after one hath been in a while at the coming forth again the air seemeth colder than the water.

The snow more cold to the sense than water, and the ice than snow, and they have in Italy means to keep snow and ice for the cooling of their drinks: *qu.* whether it be so in froth in respect of the liquor.

Baths of hot water feel hottest at the first going in.

The frost dew which we see in hoar frost and in the rymes upon trees or the like accounted more mortifying cold than snow, for snow cherisheth the ground and any thing sowed in it, the other biteth and killeth.

Stone and metal exceeding cold to the feeling more than wood, yea more than jet or amber or horn which are no less smooth.

The snow is ever in the winter season, but the hail which is more of the nature of ice is ever in the summer season; whereupon it is conceived that as the hollows of the earth are

warmest in the winter, so that region of the air is coldest in the summer, as if they were a fugueo f the nature of either from the eontrary, and a colleeting itself to an union and so to a further strength.

So in the shades under trees in the summer whieh stand in an open field, the shade noted to be colder than in a wood.

Cold effecteth congelation in liquors so as they do eonsist and hold together which before did run.

Cold breaketh glasses if they be close stopped in frost, when the liquor freezeth within.

Cold in extreme maketh metals that are dry and brittle eleft and crack, *Æraque dissiliunt;* so of pots of earth and glass.

Cold maketh bones of living creatures more fragile.

Cold maketh living creatures to swell in the joints and the blood to clot and turn more blue.

Bitter frosts do make all drinks to taste more dead and flat.

Cold maketh the arters and flesh more asper and rough.

Cold causes rheums and distillations by compressing the brain, and laxes by like reason.

Cold increases appetite in the stomach and willingness to stir.

Cold maketh the fire to scald and sparkle.

Paracelsus reporteth that if a glass of wine be set upon a tarras in a bitter frost it will leave some liquor unfrozen in the centre of the glass, which excelleth *spiritus vini* drawn by fire.

Cold in Muscovy and the like countries causes those parts which are voidest of blood, as the nose, the ears, the toes, the fingers, to mortify and rot; specially if you come suddenly to fire after you have been in the air abroad, they are sure to moulder and dissolve. They use for remedy as is said washing in snow water.

If a man come out of a bitter cold suddenly to the fire he is ready to swoon or overcome.

So contrariwise at Nova Zembla when they opened their door at times to go forth he that opened the door was in danger to overcome.[1]

The quantity of fish in the cold countries, Norway, &c. very abundant.

[1] See Three Voyages, &c. Hackl. Soc. 1853, p. 130.

The quantity of fowl and eggs laid in the cliffs in great abundance.

In Nova Zembla they found no beast but bears and foxes, whereof the bears gave over to be seen about September, and then the foxes began.[1]

Meat will keep from putrifying longer in frosty weather, than at other times.

In Iceland they keep fish by exposing it to the cold from putrifying without salt.

The nature of man endureth the colds in the countries of Scricfinnia, Biarmia, Lappia, Iceland, Gronland; and that not by perpetual keeping in in stoves in the winter time as they do in Russia, but contrariwise their chief fairs and intercourse is written to be in the winter, because the ice evens[2] and levelleth the passages of waters, plashes, &c.

A thaw after a frost doth greatly rot and mellow the ground.

Extreme cold hurteth the eyes and causes blindness in many beasts, as is reported.

The cold maketh any solid substance, as wood, stone, metal, put to the flesh to cleave to it and to pull the flesh after it, and so put to any cloth that is moist.

Cold maketh the pilage of beasts more thick and long, as foxes of Muscovy, sables, &c.

Cold maketh the pilage of most beasts incline to grayness or whiteness, as foxes, bears, and so the plumage of fowls, and maketh also the crests of cocks and their feet white, as is reported.

Extreme colds will make nails leap out of the walls and out of locks[3] and the like.

Extreme cold maketh leather to be stiff like horn.

In frosty weather the stars appear clearest and most sparkling.

In the change from frost to open weather or from open weather to frosts, commonly great mists.

In extreme colds any thing never so little which arresteth the air maketh it to congeal; as we see in cobwebs in windows, which is one of the least and weakest thrids that is and yet drops gather about it like chains of pearl.

[1] "Before the sun began to decline we saw no foxes, and then the bears used to go from us."—*Hackl. Soc.* 1853, p. 120.

[2] *even* in MS.

[3] Qu. whether *lockes* or *lockers*.

So in frosts, the inside of glass windows gathereth a dew; *qu.* if not more without.

Qu. Whether the sweating of marble and stones be in frost or towards rain.

Oil in time of frost gathereth to a substance as of tallow, and it is said to sparkle some time so as it giveth a light in the dark.

The countries which lie covered with snow have a hastier maturation of all grain than in other countries, all being within three months or thereabouts.

Qu. It is said that compositions of honey, as mead[1] do ripen and are most pleasant in the great colds.

The frosts with us are casual and not tied to any months, so as they are not merely caused by the recess of the sun, but mixed with some inferior causes. In the inlands of the northern countries as in Russia the weather for the three or four months of November, December, January, February, is constant, vt. clear and perpetual frost without snows or rains.

There is nothing in our region, which, by approach of a matter hot, will not take heat by transition or excitation.

There is nothing hot here with us but is in a kind of consumption if it carry heat in itself; for all fired things are ready to consume, chafed things are ready to fire, and the heat of men's bodies needeth aliment to restore.

The transition of heat is without any imparting of substance, and yet remaineth after the body heated is withdrawn; for it is not like smells, for they leave some airs or parts; not like light, for that abideth not when the first body is removed; not unlike to the motion of the loadstone, which is lent without adhesion of substance, for if the iron be filed where it was rubbed, yet it will draw or turn.[2]

[1] *meth* in MS.

[2] On the back of the MS. is written in Bacon's hand

Calor et Frigus
Inquisit. Legitima.

And below this again he has written first in a clear and careful hand the word *new*, and afterwards in a hurried and careless hand the word *Vetus*.

HISTORIA SONI ET AUDITUS.

PREFACE

TO THE

HISTORIA SONI ET AUDITUS.

THE following fragment was first published by Dr. Rawley in 1688, among the *Opuscula Philosophica;* and as he does not mention it among the works composed by Bacon during the last five years of his life, we may conclude that it was written before the *Sylva Sylvarum.* It may have been the commencement of the "Tables de Sono" which, as we learn from the *Commentarius Solutus,* he was preparing in the summer of 1608. If so, it must have been meant for the second in the series,— viz. Sylva, sive Carta Mater; whence its second title, "*Sylva* Soni et auditûs;" and had it been proceeded with, the several *tables—tabula essentiæ et præsentiæ, tabula absentiæ in proximo, tabula graduum,* &c.—would have followed in order. As far as it goes however, it must be classed among the rough collections, not yet reduced to order for the use of the understanding, and appears to aim at precisely the same object as the investigation concerning Sound which occupies the greater part of the second and third centuries of the *Sylva Sylvarum* (101—290.); being itself in fact one of the *Sylvæ* of which the great *Sylva* was made up. By that investigation therefore it must be considered as superseded.

I do not know that any inference of importance can be drawn from a comparison of the two; but to make the comparison easier, I have referred in the footnotes to the corre-

sponding passages of the *Sylva Sylvarum*. It will be seen that the order of the inquiry is entirely changed; so much so that I can hardly think Bacon had the Latin before him when he wrote the English; for in point of arrangement the Latin seems to be the more systematic of the two.

J. S.

HISTORIA ET INQUISITIO PRIMA

DE

SONO ET AUDITU, ET DE FORMA SONI ET LATENTE PROCESSU SONI;

SIVE SYLVA SONI ET AUDITUS.

De generatione soni, et prima percussione.
De duratione soni, et de interitu et extinctione soni.
De confusione et perturbatione soni.
De adventitiis auxiliis et impedimentis soni.
De hæsione soni, et varietate mediorum.
De penetratione soni.
De delatione soni, et directione seu fusione ejus, et de area quam occupat, simul, et separatim.
De corporum diversitate quæ reddunt sonum, et instrumentis, et de speciebus soni quæ occurrunt.
De multiplicatione, augmentatione, diminutione, et fractione sonorum.
De repercussione soni, et echo.
De conjugiis et dissidiis audibilium et visibilium, et aliarum, quas vocant, specierum spiritualium.
De celeritate generationis et extinctionis soni, et tempore in quo fiunt.
De affinitate, aut nulla affinitate, quam habet sonus cum motu aëris, in quo defertur, locali et manifesto.
De communicatione aëris percussi et elisi cum aëre et corporibus vel spiritibus ipsorum ambientibus.
De efformatione, sive articulatione soni.
De ipsissima impressione soni ad sensum.
De organo auditus, ejusque dispositione et indispositione, auxiliis et impedimentis.

De sono et auditu inter prima inquisitionem instituere visum est. Etenim expedit intellectui, et tanquam ad salubritatem ejus pertinet, ut contemplationes spiritualium (quas vocant) specierum, et operationum ad distans, misceantur cum contemplatione eorum quæ operantur tantum per communicationem substantiæ ad tactum. Deinde observationes de sonis peperunt nobis Artem Musicæ. Illud autem solenne est et quasi perpetuum, cum experimenta et observationes coaluerint in artem, Mathematicam et Practicam intendi, Physicam deseri. Quinetiam Optica paulo melius se habet; non enim tantum pictura et pulchritudo et symmetria Opticæ proponuntur; sed contemplatio omnium visibilium. At Musicæ, tantum toni harmonici. Itaque de sonis videndum.[1]

[1] Compare *Sylva Sylvarum;* introduction to Exp. 115., &c. This paragraph is printed in the original as if it were part of the table of contents which precedes. I have introduced the mark of separation and distinction of type, it being obviously intended for the *aditus* or general introduction to the whole treatise.

HISTORIA ET INQUISITIO PRIMA

DE

SONO ET AUDITU, ET DE FORMA SONI, ET LATENTE PROCESSU SONI;

SIVE

SYLVA SONI ET AUDITUS.

De generatione soni, et prima percussione.

Collisio, sive elisio, ut vocant, aëris, quam volunt esse causam soni, nec formam nec latentem processum denotat soni, sed vocabulum ignorantiæ est et levis contemplationis.[1]

Sonus diffunditur et labitur tam levi impulsu in sua generatione; item tam longe, idque in ambitum, cum non multum pendeat ex prima directione; item tam placide absque ullo motu evidenti, probato vel per flammam, vel per plumas et festucas, vel alio quovis modo; ut durum plane videatur, soni Formam esse aliquam elisionem vel motum manifestum localem aëris, licet hoc Efficientis vices habere possit.

Quandoquidem sonus tam subito generetur, et continuo pereat, necesse videtur ut aut generatio ejus aërem de sua natura paulum dejiciat, atque interitus ejus eum restituat; ut in compressionibus aquarum, ubi corpus in aquam injectum complures circulos efficiat in aquis, qui proveniunt ex aqua primum compressa, deinde in suam consistentiam et dimensionem se restituente (id quod Motum Libertatis appellare consuevimus); aut contra, quod generatio soni sit impressio grata et benevola, quæ se insinuat aëri, et ad quam libenter aër se excitat; et interitus ejus sit a vi aliqua inimica, quæ aërem eo motu atque impressione diutius frui non sinit; ut in generatione

[1] Sylv. Sylv. 124.

ipsius corporis flammæ, in qua generatio flammæ videtur fieri alacriter, sed ab aëre et inimicis circumfusis cito destrui.[1]

Fistulatio quæ fit per os absque aliqua admota fistula, possit effici sugendo anhelitum versus interiora palati, non solum extrudendo anhelitum ad extra. Atque plane omnis sorbitio aëris ad interius dat sonum nonnullum.[2] Quod dignum admodum notatu videatur: quia sonus generatur in contrarium motus manifesti aëris, ut prima aëris impulsio videatur plane efficiens remotum, nec sit ex forma soni.

Similiter si accipiatur vitreum ovum, atque per parvum foramen aër fortiter exsugatur; deinde foramen cera obturetur, et ad tempus dimittatur; post cera a foramine auferatur; audies manifeste sibilum aëris intrantis in ovum, tractum scilicet ab aëre interiore, qui post violentam rarefactionem se restituit. Ut hoc quoque experimento generetur sonus in contrarium motus manifesti aëris.

Similiter, in ludicro illo instrumento quod vocatur lyra Judaica, tenendo latera inter dentes vibratur lingula ferrea tracta ad exterius, sed resilit interius ad aërem in palato, et inde creatur sonus.

Atque in his tribus experimentis dubium non est, quin sonus generetur per percussionem aëris introrsum versus palatum aut ovum vitreum.

Generatur sonus per percussiones. Percussio illa fit, vel aëris ad aërem, vel corporis duri ad aërem, vel corporis duri ad corpus durum.

Exemplum percussionis aëris ad aërem maxime viget in voce humana, et in vocibus avium et aliorum animalium; deinde in instrumentis musicis quæ excitantur per inflationem: etiam in bombardis et sclopetis, ubi percussio edens sonum generatur maxime ex percussione aëris conclusi, exeuntis ex ore bombardæ aut sclopeti ad aërem externum. Nam pila indita non multum facit ad fragorem. Neque percussio corporis mollis ad corpus molle tantum repræsentatur in percussione aëris ad aërem, verum et aëris ad flammam, ut in excitatione flammæ per folles; etiam flammæ inter se, alia aliam impellens, reddunt quendam mugitum; utrum vero interveniat aër, inquiratur ulterius. Etiam omnis flamma subito concepta, si sit alicujus amplitudinis,

[1] S. S. 290. [2] Id. 191.

excitat sonum summovendo (ut arbitror) aërem magis quam ex sese [1]: etiam in eruptionibus fit percussio spiritus erumpentis ad aërem ambientem; ut in crepitaculis quæ fiunt ex foliis siccis, aut sale nigro, et multis aliis immissis in ignem; et in tonitru, vel erumpente spiritu e nube, vel volutante et agitato, ut fit in tonitru magis surdo et prolongato; etiam solet (ad ludicrum) folium rosæ viridis contractum ut aërem contineat, super dorsum manus aut frontem percussum, crepare per eruptionum aëris.[2]

Exempla percussionis corporis duri ad aërem ostendunt se in instrumentis musicis sonantibus per chordas; in sibilo sagittæ volantis per aërem; in flagellatione aëris, licet non percutiat corpus durum; etiam in organis musicis editur sonus per aërem percutientem aquam in fistula illa quam vocant *lusciniolam*, quæ reddit sonum perpetuo tremulum, in mota aqua et rursus se recipiente: etiam in ludicris instrumentis quibus se oblectant pueri (*Gallos* vocant) ad imitationem vocum avium [3]: similiter in aliis hydraulicis.

Exempla percussionis corporis duri ad corpus durum se ostendunt vel simpliciter vel cum communicatione aëris nonnihil conclusi, præter illum aërem qui secatur sive eliditur inter corpora dura percussa; simpliciter, ut in omni malleatione, seu pulsatione corporum durorum; cum communicatione aëris inclusi, ut in campanis et tympanis.

Lapis injectus fortiter in aquam reddit sonum; atque etiam guttæ pluviæ cadentes super aquam; nec minus unda pulsans undam: in quibus percussio fit inter corpus durum et aquam.

Videtur in generatione omnis soni illud constans esse, ut aliquæ sint partes aëris, utque requiratur aër inter corpora percussa; qui aër, in percussione corporis duri ad aërem, et corporis duri ad corpus durum, videtur manifesto secari aut elidi. Arbitror flammam ad hoc posse sufficere, vice aëris: veluti si inter flammas majores sonet campana, aut lapides percutiantur: at in percussionibus aëris ad aërem elisio aut separatio illa videtur obscurior, sed tantum videtur aër verberari et impelli, idque molliter admodum in voce leni. Attamen necesse videtur, etiam in hoc genere, ut sit aliqua elisio aëris percussi per aërem percutientem: nam etiam in aëre moto per flabellum, aër a latere; et emisso aëre

[1] S. S. 119. [2] Id. 123. [3] Id. 172.

per folles, currens ille aëris qui emittitur; dividit reliquum aërem. Verum de hoc genere elisionis aëris, quod fit ubi aëris percussio ad aërem edit sonum, ut in voce, inquiratur ulterius.

Merito dubitatur, utrum percussio illa quæ edit sonum cum aër percutitur per chordam aut alias, fiat ab initio, cum aër resiliente chorda percutitur; aut paulo post, videlicet densato per primam percussionem aëre, et deinde præstante vices tanquam corporis duri.

Ubi redditur sonus per percussionem aëris ad aërem, requiritur ut sit incarceratio aut conclusio aëris in aliquo concavo; ut in fistulando per os; in tibiis; in barbito; in voce, quæ participat ubi aër includitur in cavo oris aut gutturis.[1] In percussione corporis duri ad aërem requiritur durities corporis, et citus motus; et interdum communicatio cum concavo, ut in cithara, lyra, flagellatione aëris, etc. At in percussione corporis duri ad corpus durum minus requiritur concavum, aut celer motus.

Fabulantur de pulvere pyrio albo, qui præstaret percussionem absque sono. Certum est nitrum, quod est album, ad exufflationem plurimum valere, ita tamen ut pernicitas incensionis et percussionem et sonum multum promoveat: cita autem incensio ex carbone salicis maxime causatur, qui est niger. Igitur si fiat compositio ex sulphure et nitro et ex modico camphoræ, fieri potest ut incensio sit tardior, et percussio non ita vibrans et acuta: unde multum possit diminui de sono; sed etiam cum jactura in fortitudine percussionis. De hoc inquiratur ulterius.[2]

De duratione soni, et ejus interitu et extinctione.

Duratio soni campanæ percussæ aut chordæ, qui videtur prolongari et sensim extingui, non provenit utique a prima percussione: sed trepidatio corporis percussi generat in aëre continenter novum sonum. Nam si prohibeatur illa trepidatio, et sistatur campana aut chorda, perit cito sonus; ut fit in espinettis, ubi si dimittitur spina, ut chordam tangat, cessat sonus.[3]

Campana pensilis in aëre longe clariorem et diuturniorem reddit sonum, licet percutiatur malleo ad extra, quam si staret fixa, et similiter malleo percutiatur. Atque de diuturniore sono

[1] S. S. 116.
[2] S. S. 120.; where a different explanation is suggested. [3] Id. 207.

reddita est jam ratio, quia trepidat diutius. Quod vero etiam primitivus sonus in pensili sit magis sonorus, in stante minus, amplius inquirendum est.

Similiter scyphus argenteus aut vitreus talitro percussus, si sibi permittatur, sonum edit clariorem et diuturniorem; quod si pes scyphi altera manu teneatur fixus, longe hebetiorem et brevioris moræ.

Qui redditur in barbito aut cithara sonus, manifesto non fit a percussione inter digitum aut calamum et chordam; seu inter digitum aut calamum et aërem: sed impellente digito, ac tum resiliente chorda, et resiliendo percutiente aërem. Itaque cum chorda movetur plectro, non digito aut calamo, continuari potest sonus ad placitum, propter asperitatem fili plectri resina parum obducti; unde non labitur per chordam, nec eam semel percutit, sed hæret, eamque continenter vexat; ex quo motu sonus continuatur.[1]

Potest sumi in argumentum, quod sonus sit plane genus quoddam motus localis in aëre, quod ita subito percat. Quia in omni sectione aut impulsione aëris, aër affatim se recipiat et restituat; quod etiam aqua facit per multos circulos, licet non tam velociter quam aër.[2]

De confusione et perturbatione soni.

In actu visus visibilia ex una parte non impediunt visibilia ex aliis partibus; quin universa quæ se offerunt undiquaque visibilia, terræ, aquæ, sylvæ, sol, ædificia, homines, simul ob oculos repræsentantur. Quod si totidem voces aut soni ex diversis partibus simul salirent, confunderetur plane auditus, nec ea distincte percipere posset.[3]

Major sonus confundit minorem, ut nec exaudiatur: at species spirituales (ut loquuntur) diversi generis a sono non confundunt sonum, sed omnia simul et semel hærent in aëre, alterum altero parum aut nihil conturbante; veluti lux, aut color, calor et frigus, odores, virtutes magneticæ; omnia hæc simul possunt hærere in aëre, nec tamen magnopere impediunt vel conturbant sonos.[4]

Causa cur plura visibilia simul ad oculum repræsentantur,

[1] S. S. 137. [2] Id. 124, 125. [3] Id. 224. [4] Id. 226, 227.

altero alterum non confundente, ea omnino esse videatur; quod visibilia non cernuntur, nisi in linea recta; at soni audiuntur etiam in obliqua, aut arcuata. Itaque in area sphæræ visus quot objecta deferuntur, tot sunt coni radiorum; neque unquam alter conus in alterum coincidit: neque vertices conorum in idem punctum concurrunt, quia deferuntur in lineis rectis. At soni, qui deferuntur per lineas et rectas et arcuatas, possunt facile in unum punctum concurrere, itaque confunduntur.[1] Eadem videtur causa, cur color magis vividus colorem magis obscurum non mergat; at lux major lucem debiliorem obscurat et condit; quia lux cernitur in linea arcuata, quemadmodum et sonus. Nam licet flamma ipsa candelæ non cernitur nisi in linea recta, tamen lux undique circumfusa perfertur ad visum in lineis arcuatis, quoad corpus candelæ. Similis est ratio solis aut flammæ. Quod si opponatur, neque ipsam lucem cerni nisi in recta linea ab aëre illuminato, verum est: verum id arbitror etiam accidere sono; neque enim auditur sonus nisi in lineis rectis ab aliqua parte sphæræ soni, quo prima pulsatio pertingit. Attamen color, qui nihil aliud est quam lucis imago inæqualiter reflexa, tam debiles circumfundit species, ut aërem circumfusum parum aut nihil tingat, nisi ubi deferuntur colores in lineis rectis inter objectum et oculum.

Fiat experimentum in *aulo* (Anglice *a recorder*) duplici, in quo sit labrum, et lingua, et guttur, ad utrumque finem, ita ut applicentur ad unisonum: cava autem fistula existente duplici et continuata, sonent duo simul cantionem eandem ad utrumque finem, ac notetur utrum confundatur sonus, an amplietur, an hebetetur.[2]

Accipiantur duo cavi trunci, et conjungantur in modum crucis, ita ut in loco ubi connectuntur sint pervii; et loquantur duo ad directum et transversum truncum, et applicentur similiter aures duorum ad fines oppositos, et notetur utrum voces se invicem confundunt.[3]

De adventitiis auxiliis et impedimentis soni; de hæsione soni, et varietate mediorum.

Memini in camera Cantabrigiæ nonnihil ruinosa, ad suffulcimentum erectam fuisse columnam ferream, crassitudinis pollicis

[1] S. S. 244. [2] Id. 161. [3] Id. ibid.

fortasse et dimidii; eam columnam, baculo aut alias percussam, lenem sonum exhibuisse in camera ubi stabat columna, at in camera quæ subtus erat bombum sonorum.[1]

Inquirendum, quæ corpora, et cujus soliditatis et crassitudinis, omnino arceant et excludant sonum; atque etiam quæ magis aut minus eum hebetent, licet omnino non intercipiant. Neque enim adhuc constat, quæ media interjecta magis propitia sint, quæ magis impedientia. Itaque fiat experimentum in auro, lapide, vitro, panno, aqua, oleo, et eorum crassitudine respectiva. De hoc omnino inquirendum est ulterius.[2]

Aër medium ad sonum est maxime propitium, et quasi unicum.[3] Rursus, aër humidior (arbitror) magis defert sonum quam siccior: at in nebula quid fit, non memini.[4] Nocturnus etiam magis quam diurnus: verum id silentio assignari potest.[5]

Inquiratur de medio flammæ, qualis sit operationis versus sonum; utrum videlicet flamma alicujus crassitudinis omnino arceat et intercipiat sonum, aut saltem eum magis hebetet quam aër. In ignibus Jubili hoc experiri licet.[6]

Inquirendum etiam de medio aëris vehementer moti. Licet enim ventus deferat sonum, arbitror tamen ventos vehementiores nonnihil turbare sonum, ut minus longe exaudiatur etiam secundum ventum, quam in tranquillo: de quo inquiratur ulterius.[7]

Videndum qualem reddit sonum æs, aut ferrum ignitum malleo percussum, comparatum ad eum quem reddit frigidum.[8]

De penetratione soni.

Lapis aëtites habet tanquam nucleum aut ovum lapidis, qui agitatus reddit sonum obtusum; item tintinnabula, sed longe clariorem si detur rima.[9]

Inquiratur ab urinatoribus, si omnino audiant subter aquam, præsertim profundiorem: atque inquiratur plane utrumque; non tantum utrum audiant sonum aliquem de supra, qui editur in aëre; sed etiam utrum audiant percussionem corporis aquæ intra aquam, ubi non est aër. Expertus hoc sum in balneo; demittebatur situla bene capax; ita autem demittebatur ore

[1] S. S. 151. [2] Id. 212—220. [3] Id. 217. [4] Id. 218.
[5] Id. 143. [6] Id. 219. [7] Id. 193. [8] Id. 160. [9] Id. 154.

inverso in æquilibrio, ut omnino in concavo suo deferret secum aërem subter aquam ad altitudinem palmæ unius; atque ad hunc modum tenebatur situla manibus depressa, ne everteretur aut resurgeret: tum urinator inserebat caput in concavum situlæ, et loquebatur: exaudiebatur vox loquentis; etiam sermo intelligebatur articulatim, sed mirum in modum acutus, et instar sibili fere, qualis in puparum ludo vox exaudiri solet.[1]

Inquiratur illud exacte, ut reddatur omnino positivum, utrum possit generari sonus nisi sit aër inter percutiens et percussum corpus.[2] Veluti demittantur duo lapilli pensiles per filum in pelvim aquæ vel flumen, et agitentur ut percutiant se invicem in medio aquæ; vel mittatur forceps apertus in medium aquæ, et ibi claudatur: et notetur utrum edat sonum, et qualem.[3] Equidem existimo urinatores cum natant subter aquam non edere sonum; nisi fortassis aliquis esse possit per successionem motus ad superficiem aquæ, atque inde percutiente aqua aërem.

Dubium non est, quin in utribus clausis nec prorsus impletis, et agitatis, reddatur sonus, liquoris scilicet in iis contenti: nec minus redditur sonus demisso lapide in aquam, cum percutiat fundum vasis. Verum in primo experimento admiscetur aër; in secundo percussio fundi vasis per lapillum communicat cum aëre extra vas. At post percussionem primam non necesse est ut aër sit in medio per universam aream sphæræ deferentis: nam id evincitur per experimentum loquentis in situla subter aquam, ubi pars deferentis ex aqua non est aër, sed lignum situlæ et aqua; unde acuitur et minuitur sonus, et extinguitur.

Quoniam autem manifestum est, per corpora dura (velut terram figularem et vitrum) transire et penetrare sonum; idque etiam certissimum est (licet adhuc hominum observationem latuerit) inesse in omni corpore tangibili pneumaticum quiddam præter partes crassas intermixtum, videndum num hujusmodi penetratio soni non inde fiat, quod partes pneumaticæ sive aëreæ corporis tangibilis communicent cum aëre externo.[4]

Accipe catinum aquæ argenteum, alterum ligneum; accipe

[1] S. S. 155.

[2] "It is certain, howsoever it cross the received opinion, that sounds may be created without air."—*S. S.* 133.

[3] "You shall hear the sound of the tongs well, and not much diminished."—*Id. ibid.*

[4] S. S. 136.

forcipem ferream, et percute fines ejus intra aquam in catinis illis, in distantia latitudinis pollicis fortasse aut amplius a fundo: audies sonum forcipis percussæ in catino argenteo magis multo sonorum quam in ligneo. Quod si tamen vacua forent catina, et percuteretur forceps ad eandem distantiam, parum aut nihil interesset. Ex quo liquet primum, ubi nullus est aër qui possit elidi, sed tantum aqua, edi sonum; deinde, melius communicari sonum editum per percussionem cum catino per aquam quam per aërem.[1]

Clauso[2] ore fortiter, redditur murmur (quale solet esse mutorum) per palatum; quod si nares etiam fortiter obturentur, nullum possit fieri murmur. Unde liquet, sonum illum per palatum non actuari, nisi per apertum quod intercedit inter palatum et nares.[3]

De delatione soni, et directione seu fusione ejus; et de area quam occupat, simul, et separatim.

Omnis sonus diffunditur in ambitum sphæricum a loco pulsationis, et occupat universam aream ejus sphæræ ad terminum certum, sursum, deorsum, lateraliter, undequaque.[4]

Per aream ejus sphæræ fortissimus est sonus juxta pulsationem: deinde secundum proportionem distantiæ elanguescit, et demum evanescit.

Termini ejus sphæræ extenduntur, pro acumine auditus, aliquatenus; sed est quiddam ultimum, quo in sensu maxime exquisito non pertingit sonus.

Est (arbitror) nonnihil in directione primæ impulsionis. Si quis enim staret in suggesto aperto in campis, et clamaret, longius arbitror exaudiri posset vox in prorsum a loquente, quam pone. Sic si displodatur bombarda vel sclopetus, longius arbitror exaudiri possit sonus in prorsum a bombarda aut sclopeto, quam pone.[5]

Utrum aliquid sit in ascensione soni sursum, aut in descensione soni deorsum, quod sonum promoveat in ulterius, aut cessare faciat propius, non constat. Auditur quidem plane sonus, si quis ex alta fenestra aut turri loquatur, ab iis qui

[1] S. S. 134.

[2] This is printed in the original as if it were part of the preceding paragraph; by a mistake no doubt of the printer or transcriber.

[3] S. S. 287. [4] Id. 201. [5] Id. 204

stant in solo; et contra, editus ab iis qui in solo stant, a fenestra aut turri: sed ab utris facilius, aut longius, de eo inquiratur ulterius.[1]

Solent in concionibus usurpari suggesta, et in concionibus imperatoriis monticelli ex cespitibus; sed minime tamen per hæc evincitur sonum facilius defluere quam insurgere; quoniam hujus rei possit esse causa liber in loco altiore aër, nec obstipatus aut impeditus, ut fit infra in turba: non autem motus proclivior in deorsum. Itaque in hoc experimento non acquiescat contemplatio, sed fiat experimentum ubi cætera sint paria.[2]

Vis soni excipitur tota in qualibet parte aëris, non tota in toto aëre, nisi foramen aut meatus fuerit valde exilis; nam si stet quis in loco aliquo maxime clauso, ita ut non penetret sonus omnino, idque in quacunque parte sphæræ soni, et fiat foramen parvum, vox articulata intrabit per illud foramen, et denique per tot foramina quot placuerit terebrare per universum ambitum sphæræ soni: ut manifestum sit totam illam articulationem soni deferri integram per minusculas illas partes aëris, non minus quam si aër esset undique apertus.[3]

Attendendum tamen est, utrum soni editi ex pulsationibus majoribus aëris (quales fiunt ex displosionibus bombardarum) non deveniant exiliores cum intrent illa parva foramina. Subtilitates enim sonorum forte intrare possunt non confusæ, sed universus fragor neutiquam. De hoc inquiratur ulterius.[4]

Radii corporum visibilium non feriunt sensum, nisi deferantur per medium in directum; et interpositio corporis opaci in linea recta intercipit visum, licet alia omnino fuerint undequaque aperta. Verum sonus, si detur delatio vel meatus, vel arcuando per sursum vel inversa arcuatione per deorsum vel lateraliter vel etiam sinuando, non perit, sed pervenit. Attamen arbitror fortius deferri sonum per lineas directas inter pulsationes et aurem, et frangi nonnihil impetum per arcuationes et per sinuationes; veluti si paries sit inter loquentem et audientem, arbitror vocem non tam bene exaudiri quam si abesset paries.[5] Arbitror etiam si paulo longius collocetur vel loquens vel audiens a pariete, melius exaudiri vocem quam

[1] S. S. 205. [2] Id. Ibid. [3] Id. 192. [4] Id. 216.

[5] Id. 202. "They move strongest in a right line; *which nevertheless is not caused by the rightness of the line, but by the shortness of the distance: linea recta brevissima.*"

prope parietem, quia arcuatio tanto minus abit a linea recta.[1] Verum de hoc inquiratur ulterius.

Admota aure ad alterum terminum tubi alicujus aut cavi trunci longi, et voce submissa ad alterum orificium tubæ, exaudiri possit vox talis, quæ eadem submissione edita ad aërem apertum non pertingeret nec exaudiretur. Unde liquet, clausuram illam aëris conferre ad deferendam vocem absque confusione.[2]

Etiam communis est opinio, melius exaudiri vocem, cæteris paribus, sub tecto quam sub dio: utrum vero melius exaudiatur vox, aure collocata in aperto, voce in tecto; aut contra, aure in tecto, voce in aperto; inquiratur ulterius: licet etiam in hoc communis sit opinio, melius exaudiri quæ foras sunt in ædibus, quam quæ in ædibus foras.[3]

Commune est auditui ac visui, ac etiam quadantenus cæteris sensibus, ut intentio animi sentientis et directio expressa ad percipiendum nonnihil juvet; ut cum quis dirigit intuitum, aut (ut loquuntur) arrigit aures.[4]

Soni non perferuntur æque longe articulati et distincti, quam species et glomeratio ipsorum confusa: nam strepitus vocum exaudiri potest, ubi voces ipsæ articulatæ non audiuntur; et tinnitus musicæ confusus, cum harmonia ipsa aut cantio non exaudiatur.

In trunco cavo optime conservatur sonus. Igitur accipiatur truncus cavus, bene oblongus, et demittatur extra fenestram cameræ humilioris; loquatur quispiam exerendo caput extra fenestram ad unum terminum trunci, quam maxime potest submisse; apponat alter aurem ad alterum terminum trunci, stans infra in solo: fiat similiter hoc via versa, loquendo infra, aurem apponendo supra; atque ex hoc experimento fiat judicium, utrum vox ascendat aut descendat proclivius, aut etiam pariter.[5]

Tradunt pro certo esse loca et ædificia nonnulla ita concamerata, ut si quis stet in quadam parte cameræ et loquatur, melius exaudiri possit ad distantiam nonnullam quam prope.[6]

Omnis concentus paulo gravius et profundius sonare videtur, si removeatur nonnihil a sono edito, quam prope: ut simile quiddam videatur accidere auditui circa sonum, quale accidit

[1] S. S. 214. [2] Id. 129.

[3] "And *it is certain* that the voice is better heard in a chamber from abroad than abroad from within the chamber."—*S. S.* 130.

[4] Id. 235. [5] Id. 206. [6] Id. 148.

visui circa species visibiles, ut nonnulla distantia ab organo sensus promoveat perceptionem sensus.

Verum fallax potest esse ista opinio, idque dupliciter. Primo, quod in actu visus requiruntur forte radii ab objecto ad pupillam, qui nulli possunt esse ubi objectum tangit pupillam; id quod inter auditum et sonum non requiritur; sed multo magis, quod ad videndum opus est luce. Objectum autem tangens pupillam intercipit lucem: at nihil hujusmodi auditui competit. Secundo etiam, quia in visu non semper desideratur medium: quandoquidem in tollendis cataractis oculorum, stylus ille parvus argenteus, quo summoventur cataractæ, etiam super pupillam intra tuniculam oculi movens, optime cernitur.[1]

In objectis visus, si collocetur oculus in tenebris, objectum in luce, bene habet; si objectum in tenebris, oculus in luce, non fit visio. Ita si velum tenue ponatur ob oculos, aut reticulum, objectum bene cernitur; si super objectum, confundit visum. Atque licet fortasse neutrum horum competat sono et auditui, tamen monere possunt ut fiant experimenta, utrum auris collocata juxta truncum cavum, si sonus fiat ad distans in aperto; aut, via versa, sonus excitatus ad cavum truncum, auris autem ponatur ad distans in aperto, promoveat magis perceptionem sensus.[2]

De corporum diversitate quæ reddunt sonum, et instrumentis, et de speciebus soni quæ occurrunt.

Genera sonorum talem videntur subire partitionem: magnus, parvus; acutus, gravis; harmonicus, absonus; summis sus sive susurrans, exterior sive sonans; simplex, compositus; originalis, reflexus: ut sint partitiones sex.[3]

Quo fortior fuerit prima pulsatio, et delatio liberior et absque impedimento, eo major editur sonus: quo debilior percussio, et magis conturbata delatio, eo minor.[4]

Acuti soni deferuntur æque longe, et fortasse longius, quam graves. De hoc melius inquiratur.

[1] Compare 675., and S. S. 272.

[2] "And it is tried that in a long trunk of some eight or ten foot, the sound is holpen, though both the mouth and the ear be a handful or more from the ends of the trunk; and somewhat more holpen when the ear of the hearer is near than when the mouth of the speaker."—*Id.* 130.

[3] "There be these differences in general by which sounds are divided: 1. Musical, immusical. 2. Treble, base. 3. Flat, sharp. 4. Soft, loud. 5. Exterior, interior. 6. Clean, harsh or purling. 7. Articulate, inarticulate."—*Id.* 290.

[4] Id. 164.

Prout majus fuerit concavum campanæ, eo graviorem edit sonum; quo minus, acutiorem.

Quo major fuerit chorda, eo reddit sonum graviorem; quo minor, acutiorem.[1]

Quo intentior fuerit chorda, eo reddit sonum acutiorem; quo laxior, graviorem: ut chorda paulo major strictius extensa, et minor laxius, eundem possint reddere sonum.[2]

In tubis similiter, et tibiis, et cornibus, et fistulis, atque etiam in ore hominis fistulantis, quo angustiora sunt et magis contracta, eo reddunt sonum acutiorem; quo latiora aut laxiora, graviorem.[3]

In tibiis, aër exiens ex foramine propiore ad spiritum, reddit sonum acutiorem; e longinquiore, graviorem[3]: ut tibia paulo major ad foramen propius, et minor ad longinquius, eundem possint reddere sonum.

In instrumentis chordarum nonnullis (ut in barbito, citharis, et similibus) invenerunt homines commoditatem ad extensionem earum præter extensionem primam, ut comprimentes eas digitis inferius aut superius, eas extendant ad alterationem soni.[4]

Si accipiatur scyphus vitreus aut argenteus et talitro percutiatur, si aqua in scypho altius ascenderit, et scyphus plenior fuerit, reddit sonum acutiorem; si humilius, et scyphus magis vacuus fuerit, graviorem.[5]

In trunco cavo, quali ad aves percutiendas utuntur, si quis ore fistulet, admoto ore ad alterum finem trunci, hebetatur scilicet sonus ad astantem; at si applicetur auris ad alterum finem, reddit sonum acutissimum, ut vix tolerari possit.[6]

Fiat experimentum in trunco ex parte ubi collocatur auris angusto, ex parte ubi collocatur os latiore, (et e converso,) utrum sonus reddatur acutior aut gravior; in modum speculorum quæ contrahunt aut ampliant objecta visus.

De multiplicatione, augmentatione, et diminutione, et fractione soni.

VIDENDUM quomodo possit artificialiter sonus majorari et multiplicari. Specula utrumque præstant in visu.[7] Videtur autem reflexio subita soni verti in augmentum: nam si vox et echo simul reddantur, necesse est ut non distinguatur sonus,

[1] S. S. 178. [2] Id. 179. [3] Id. 178.
[4] Id. 181. [5] Id. 183. [6] Id. 138. [7] Id. 285.

sed majoretur. Itaque soni super flumina ampliores sunt, resonante aqua et se uniente cum sono originali.[1]

Etiam notavi, facta æde rotunda in conductibus (ut loquuntur) aquarum, et deinde caverna oblonga, ac tum æde majore (quale est videre in campis juxta *Charing-cross* prope Londinum), si fiat clamor per fenestram aut rimam ædis rotundæ, et stet quispiam juxta fenestram ædis majoris, longe terribiliorem cieri rugitum, quam fit ad aurem alicujus astantis prope ubi fit clamor.[2]

Memini in jocularí ludo puparum, locutionem ita edi, ut audiatur distincte, sed longe acutior et exilior quam in aperto; ut fit in speculis quæ reddunt literas longe minutiores quam sunt in medio ordinario: ita ut videatur plane sonus per artem reddi posse et amplior et exilior.

Tenent pueri cornu arcus tensi inter dentes, et sagitta percutiunt chordam, unde redditur sonus magis sonorus, et quasi bombus longe major, quam si arcus non teneretur a dentibus: quod imputant consensui quem habent ossa dentium cum osse auditus; quandoquidem et via versa, ex stridore in auditu etiam dentes obstupescant.[3]

Similiter tangat hasta lignum cavi lyræ, præsertim foraminis in ipso ad cavum finem, et teneatur dentibus ex altero fine, et sonet lyra; major fit sonus per prehensionem dentium, ei scilicet qui prehendit.

Certissimum est (licet non animadversum) quod vis illa, quæ post primam percussionem defert pilas aut sagittas aut spicula, et similia, consistat in partibus minutis corporis emissi, et non in aëre perpetuo deferente, instar scaphæ in aqua. Hoc posito, videndum utrum non possit diminui sonus in bombarda, aut sclopeto, absque magna debilitatione percussionis, hoc modo. Fiat sclopetum cum tubo bene forti, ut non facile frangatur; fiant in tubo quatuor aut quinque foramina, non instar rimarum, sed rotunda circa medium tubi. Percussio suas jam accepit vires, nisi quatenus ratione longitudinis tubi augeantur: at percussio aëris ad exitum sclopeti, quod generat sonum, multum extenuabitur ab emissione soni per illa foramina in medio, antequam aër inclusus perferatur ad os sclopeti. Itaque probabile est, sonum illum et bombum multis partibus diminutum fore.[4]

[1] S. S. 144. 229. [2] Id. 140. [3] Id. 149.
[4] Id. 120. "And if any man think that the sound may be extinguished or deaded

De repercussione soni, et echo.

Repercussio sonorum (quam *echo* vocamus) in argumentum sumi potest, non esse sonum motum localem aëris. Nam si esset, debuerat repercussio fieri in modo consimili ad originale; ut fit in omnibus repercussionibus corporeis. At in sono cum tam accurata requiratur generatio, ut in voce, quæ tot habet instrumenta, et in instrumentis musicis quæ subtiliter fabricata sunt, ea quæ reddunt sonum repercussum nihil horum habent, sed rudia plane sunt, et illud fere habent ut sonus non transeat, vix aliud quippiam.[1]

De conjugiis et dissidiis audibilium et visibilium, et aliarum, quas vocant, specierum spiritualium.

Conveniunt in his.[2]

Ambo diffunduntur in circuitum sphæricum, et occupant universam aream ejus sphæræ, et feruntur ad spatia bene longinqua, et elanguescunt paulatim secundum distantiam objecti, deinde evanescunt. Ambo deferunt figuras et differentias suas per portiones minutas sphæræ suæ, integras et inconfusas; ut percipiantur per foramina parva non secus quam in aperto.

Ambo sunt generationis et delationis valde subitæ ac celeris; ac e contra extinguuntur et pereunt subito et celeriter.

Ambo suscipiunt et deferunt minutas differentias et accuratas, ut colorum, figurarum, motuum, distantiarum in visibilibus; vocum articulatarum, tonorum harmonicorum, et pernicis alterationis sive trepidationis ipsorum in audibilibus.

Ambo in virtute et viribus suis non videntur vel emittere aliquam corporalem substantiam in media sua, aut ambitum sphæræ suæ; nec etiam edere aut ciere manifestum motum localem in mediis suis, sed deferre quasdam species spirituales, quarum ignoratur ratio et modus.

Ambo videntur non generativa alicujus alterius virtutis aut

by discharging the pent air before it cometh to the mouth of the piece and to the open air, that is not probable; for it will make more divided sounds; as if you should make a cross barrel hollow through the barrel of a piece, it may be it would give several sounds, both at the nose and at the sides."

[1] S. S. 287. Id. 255—266.

qualitatis præter virtutem propriam, et eatenus operari; alias sterilia esse.

Ambo in propria sua actione videntur tria quasi corporaliter operari. Primum, quod fortius objectum mergat et confundat debilius, ut lux solis lucem candelæ, displosio bombardæ vocem. Secundum, quod excellentius objectum destruat sensum debiliorem, ut lumen solis oculum, sonus violentus in proximo ad aurem auditum. Tertium, quod ambo repercutiuntur, ut in speculis et echo.

Neque objectum unius confundit aut impedit objectum alterius; velut lux aut color sonum, aut e contra.

Ambo afficiunt sensum in animalibus, idque objectis secundum magis aut minus gratis aut odiosis: attamen afficiunt etiam modo suo inanimata proportionata et organis sensuum (ut videtur) conformia; ut colores speculum, quod crystallinum est instar oculi; soni locos reverberationis, qui videntur etiam similes ossi et cavernæ auris.

Ambo operantur varie prout habent media sua bene aut perperam disposita.

Ad ambo medium magis conducibile et propitium est aër. In ambobus, in objectis accuratioribus, nonnihil affert intentio sensus, et quasi erectio ejus ad percipiendum.

Differunt in his.[1]

Videntur species visibilium esse tanquam emissiones radiorum a corpore visibili, instar fere odorum. At species audibilium videntur magis participare ex motu locali, instar percussionum quæ fiunt in aëre: ut cum dupliciter plerumque operentur corpora, per communicationem naturæ suæ, aut per impressionem aut signationem motus, videatur diffusio illa in visibilibus magis ex primo modo participare, in audibilibus ex secundo.

Videtur delatio sonorum magis manifesto deferri per aërem, quam visibilium. Neque enim, arbitror, ventus vehemens tantum impedire potest aliquod visibile a longe, quam sonum; flante, intelligo, vento in contrarium.

Insignis est illa differentia, unde etiam plurimæ minores differentiæ derivantur, quod visibilia (excepta luce originali) non

[1] S. S. 268—276.

feruntur nisi per lineas rectas, cum soni deferantur per lineas arcuatas.

Hinc fit quod visibilia alia alia non confundant simul repræsentata; soni contra. Hinc fit quod soliditas substantiæ non videatur impedire visum magnopere, modo posituræ partium corporis sint ordine simplici et per rectos meatus, ut in vitro, aqua, crystallo, adamante: at parum panni serici aut linei rumpit visum, cum sint corpora valde tenuia et porosa; at hujusmodi panni parum aut nihil impediunt auditum, ubi solida illa quam plurimum. Hinc fit quod ad reverberationem visibilium sufficiat parvum speculum, aut simile corpus perspicuum, modo ponatur in linea recta, ubi visibilia meant; at ad faciendam reverberationem echus oportet sonum etiam a lateribus includere, quia fertur undequaque.

Longius fertur objectum visibile, pro rata proportione, quam sonus.[1]

Visibilia nimis prope admota ad oculum non tam bene cernuntur quam per distantiam nonnullam, ut radii coire possint in angulo magis acuto: at in auditu, quo propius, eo melius. Verum in hoc duplex potest esse error. Prior, quod ad visum requiritur lux: ea autem, objecto ad oculum propius admoto, arcetur. Nam audivi ex fide digno, qui curabatur ex cataractis oculorum, cum stylus ille minutus argenteus duceretur super ipsam pupillam oculi sui, eamque tangeret, absque ullo medio (existente stylo illo, seu acu argentea, longe angustiore quam pupilla erat oculi) eum clarissime vidisse stylum illum. Secundus, quod sit plane interposita caverna auris ante instrumentum auditus, ut sonus exterior tangere os et membranam auditus plane nequeat.

Celerius deferuntur species visus quam soni, ut percipitur in flamma, et sonitu sclopetorum; etiam in fulgure, et tonitru, ubi tonitru auditur post pausam.

Etiam existimo diutius hærere species soni, quam visibilia. Licet enim et illæ non subito intereant, ut manifestum est in circulo vertente, et chordis talitro percussis, et crepusculo, et similibus; tamen diutius arbitror durant soni, quia deferuntur a ventis.

Radii lucis glomerati etiam inducunt calorem, quæ est actio

[1] In the original this sentence stands as part of the preceding paragraph; which is clearly wrong.

diversa a visibili. Similiter, si verum sit clamores aves volantes dejecisse, etiam ea est actio protinus diversa ab audibili.[1]

Non videtur in visibili esse objectum tam odiosum ad sensum, quam in audibili; sed magis ex æquo. Nam fœda visui magis displicent ob excitationem phantasiæ de rebus fœdis, quam propter se; at in audibilibus, sonitus serræ dum acuitur, et similia, inducunt horrorem; et tonus discordans in musica statim rejicitur et respuitur.

Non constat esse refractionem in sonis, ut in radiis. Attamen proculdubio resiliunt soni; sed illud reflexioni assignandum. Neque enim (arbitror) si sonus pertranseat diversa media, ut aërem, pannum, lignum, alium esse locum soni ubi defertur, alium ubi audiatur; id quod proprium refractionis est[2]; sed videtur pendere ex operatione in lineis rectis refractio; id quod non competit sono.

Contractio vero soni et dilatatio ejus, secundum dispositionem medii fit proculdubio, ut in puparum vocibus et locutione sub aqua: contrahitur sonus in caverna illa, in campis dilatatur; quemadmodum per specula dilatantur et contrahuntur visibilia.

Medium trepidans (ut fumus in visibilibus) facit visibilia objecta etiam trepidare: at in sonis nihil adhuc tale invenitur, nisi forte accessio et recessio per ventos.[3] Nam trepidatio in fistula lusciniolæ, est trepidatio percussionis, non medii.

Post multam lucem mutando ad tenebras, vel post tenebras ad lucem, confunditur parum visus: utrum vero hoc fiat a magnis fragoribus, aut alto silentio, inquirendum.

De celeritate generationis et extinctionis soni, et tempore in quo fiunt.

Omnis sonus cito admodum generatur, et cito interit. Celeritas autem motus ipsius, et differentiarum ejus, non tam mirabilis res videtur. Etenim digitorum motus in cithara, aut anhelitus in fistula aut tibia, celeres admodum inveniuntur;

[1] S. S. 267.

[2] Id. 254. The last sentence of this paragraph is omitted in the *Sylva Sylvarum*, and in place of it we read, "But majoration, which is also the work of refraction, appeareth plainly in sounds, as hath been handled at full, but it is not by diversity of mediums."

[3] Id. 264.

etiam lingua ipsa (non curiosum prorsus organum) tot peragit motus quot literas. Quod vero soni non solum tam perniciter generentur, sed et tantum spatium sua vi et impressione quasi momentanea occupent subito, id summam admirationem habet. Nam, exempli gratia, homo in medio campo vociferans exauditur ad quartam partem milliaris in ambitu, idque verbis articulatis, iisque in singulis minutis portionibus aëris hærentibus, idque in spatio temporis longe minore fortasse minuto.[1]

De spatio temporis in quo defertur sonus, inquirendum. Id hoc modo inveniri potest. Stet homo in campanili, noctu; stet alter in plano, ad distantiam forte milliaris, aut quam procul campana exaudiri possit, habeatque paratam facem lucentem, sed co-opertam. Sonet campana in campanili; quam cito illa exaudiatur ab illo altero qui stat in plano, attollat ille facem; per hoc, ex spatio temporis inter campanam pulsam et facem visam, deprehendi possunt momenta motus soni ab eo qui stat in campanili.[2]

In tormentis igneis flamma conspicitur antequam bombus exaudiatur; cum tamen flamma sequatur exitum pilæ: ut flamma tardius exeat, citius sensum feriat. Unde recte colligitur, radios visibiles celerius diffundi et pervenire, quam species aut impressiones soni.[3]

De affinitate aut nulla affinitate quam habet sonus cum motu aëris in quo defertur locali et manifesto.

Sonus non videtur manifesto et actualiter quatefacere et turbare aërem, ut ventus solet; sed videntur motus soni fieri per species spirituales; ita enim loquendum, donec certius quippiam inveniatur.[4]

Adeo ut existimem, sonum clamantis bene magnum, in parva ab ipso motu anhelitus distantia, vix folium aliquod populi albæ tremulum, aut festucam, aut flammam moturum.

Attamen in pulsationibus majoribus deprehenditur motus plane corporalis et actualis aëris: id vero utrum fiat a motu ipso qui generat sonum, an a concausa, aut concomitantia, non constat. Tonitrua quandoque tremere faciunt fenestras vitreas, et etiam parietes: arbitror etiam bombardas displosas, aut eruptiones cuniculorum subterraneorum idem facere.[5]

[1] S. S. 289. [2] Id. 209. [3] Id. 210. [4] Id. 125. [5] Id. 126.

Memini etiam, ni fallor, apud Collegium Regium in Cantabrigia, esse ligneam quandam fabricam in qua campanæ pendent, eamque a campanis quando sonant quatefieri. Sed qualiscunque fuerit ille occultus motus qui est sonus, apparet illum nec absque manifesto motu in prima pulsatione gigni, et rursus per motum manifestum aëris deferri aut impediri.[1]

Verbum placide prolatum, quod ad distantiam triginta pedum forte exaudiri possit, tamen admotam flammam candelæ prope os, ad unum pedem etiam, vix trepidare faciet: ubi paulo intensior flatus oris flammam faciet tremulam multo in longiore distantia.[1]

Sonus campanarum, et similium, accedit clarior, aut recedit hebetior, prout flat ventus versus aurem aut adversus. Idem fit in clamore: qui contra ventum editus non tam longe auditur.[1]

Traditur, per ingentes clamores applaudentium, et voces jubili, ita aërem collisum aut rarefactum fuisse, ut deciderent aves volantes. Opinio vagatur, sonitus complurium campanarum simul, in urbibus populosis, contra et fulminum perniciem et pestilentias valere.[2]

Traduntur pro certo loca et ædificia nonnulla ita concamerata, ut si quis loquatur, atque (ut fertur) locutio ista fiat contra parietem in una parte cameræ, melius exaudiantur verba post distantiam nonnullam a voce, quam prope.[3]

Notavi sedens in curru, et demisso ex una parte velo currus, aperto ex altera, mendicum, qui clamabat ex latere currus clauso, ita visum esse ac si clamaret ex latere aperto; ut vox plane repulsa circuiret, aut saltem undique sonans putaretur tamen ex ea parte audiri qua melius pertingeret.[4]

Si teneatur candela juxta foramen illud quod spiraculum est tympani, et percutiatur tympanum, concutitur et extinguitur flamma. Idem fit in sonando cornu venatoris, si apponatur candela ad exitum cornu, etc.

Etiam exquisitæ differentiæ, quas suscipit sonus, easque secum defert, demonstrant hujusmodi molles affectus non esse motus continuos locales. Nam sigilla certe in materia accommodata faciunt exquisitas impressiones; ita ut in generatione soni fortasse hoc fieri possit. Sed delatio et continuatio illa non competit, præsertim in liquidis. Exquisitas autem illas

[1] S. S. 125. [2] Id. 127. [3] Id. 148. [4] Id. 203.

differentias intelligimus de vocibus articulatis et tonis harmonicis.[1]

Verum omnino de hac re (videlicet, quam relationem et correspondentiam habeat sonus ad motum localem aëris) inquiratur diligentius; non per viam *utrum* (quod genus quæstionis in hujusmodi rebus omnia perdidit), sed per viam *quatenus:* idque non per argumenta discursiva, sed per apposita experimenta et instantias crucis.

De communicatione aëris percussi et elisi cum aëre et corporibus vel spiritibus ipsorum ambientibus.

In percussione campanæ, sonus editus per percussionem campanæ cum malleo ab extra, et cum embolo ad intra, ejusdem est toni. Adeo ut sonus redditus per percussionem ab extra non possit generari per collisionem aëris inter malleum et extima campanæ; quandoquidem habeat rationes ad concavum campanæ ab intra. Et si foret lamina plana æris, non concavum quippiam, alius opinor foret sonus.[2]

Si fuerit rima in campana, reddit sonum raucum, non jucundum aut gratum.[3]

Videndum, quid faciat corporis quod percutitur crassitudo ad sonum, et quousque; veluti, si ejusdem concavi una campana sit crassior, altera tenuior. Expertus sum in campana ex auro, eam reddere sonum excellentem, nihilo pejorem, imo meliorem, quam campanam argenteam aut æneam. Attamen nummus aureus non tam bene tinnit quam argenteus.[4]

Dolia vacua reddunt sonum profundum et sonorum, repleta hebetem et mortuum.

At in barbito, cithara, et hujusmodi, licet prima percussio sit inter chordam et aërem exteriorem; tamen statim ille aër communicat cum aëre in ventre sive cavo barbiti aut citharæ. Unde in hujusmodi instrumentis fit semper perforatio aliqua, ut aër exterior communicet cum aëre concluso, absque quo sonus foret hebes et emortuus.

Fiat experimentum fistulæ illius lusciniolæ, ut impleatur oleo, non aqua; et notetur quanto sonus sit mollior, aut obtusior.

Cum redditur sonus inter anhelitum et aërem percussum in fistula aut tibia, ita tamen redditur, ut habeat communicatio-

[1] S. S. 288. [2] Id. 124. [3] Id. 169. [4] Id. 222.

nem nonnullam cum corpore tibiæ aut fistulæ. Alius enim fit sonus in tuba lignea, alius in ænea; alius, arbitror, si tuba per interius, aut fortasse etiam per exterius, fuerit obducta serico aut panno; alius fortasse si tuba fuerit madida, alius si sicca.[1] Etiam existimo in espinettis aut barbito, si tabula illa lignea super quam extenduntur chordæ foret ænea aut argentea, diversum nonnihil possit edere sonum.[2] Verum de his omnibus inquiratur ulterius. Etiam quatenus ad communicationem, inquirendum est, quid possit corporum diversitas et inæqualitas: veluti si penderent tres campanæ, una intra alteram, cum spatio aëris interposito, et percuteretur campana exterior malleo, qualem editura foret sonum respectu campanæ simplicis.[3]

Obducatur campana ab extra panno aut serico, et notetur, quando pulsatur campana per embolum interius, quid faciat obductio illa ad sonum.

Si foret in barbito lamina ænea aut argentea foraminata loco ligneæ, videndum quid hoc faciat ad sonum.

Usurpantur in Dania, atque etiam deferuntur ad nos, tympana ænea, non lignea, minora ligneis, atque edunt sonum (arbitror) magis sonorum.

Agitatio aëris in ventis vehementioribus non multum (arbitror) redditura sit sonum, si absint sylvæ, fluctus, ædes, aut similia; attamen receptum est, ante tempestates fieri murmura nonnulla in sylvis, licet flatus ad sensum non percipiatur, nec moveantur folia.

Desunt tria capitula, quæ perficere non vacabat.

[1] S. S. 167. 234. [2] Id. 229. [3] Id. 158.

PHÆNOMENA UNIVERSI.

PREFACE

TO THE

PHÆNOMENA UNIVERSI.

THE fragment which follows was first published by Gruter in 1653, who places it among the *Impetus Philosophici.* It appears to have been meant originally for the commencement of the third part of the *Instauratio,* with the design of which, as described in the *Distributio Operis* and the *Parasceve,* it agrees very well as far as it goes. "Tertia pars operis" (says Bacon in the *Distributio*) "complectitur *Phænomena Universi;* hoc est omnigenam experientiam, atque *historiam naturalem ejus generis quæ possit esse in ordine ad condendam philosophiam* .... Neque *corporum* tantum historiam exhibemus, sed diligentiæ insuper nostræ esse putavimus etiam *virtutum ipsarum* (illarum dicimus quæ tanquam *cardinales* in naturâ censeri possint, et in quibus naturæ primordia plane constituuntur, utpote naturæ primis passionibus ac desideriis; viz. *denso, raro;* calido, frigido; consistente, fluido; gravi, levi; aliisque haud paucis) historiam seorsim comparare." "Quod vero" (he adds in the the *Parasceve,*) "in distributione operis nostri mentionem fecimus *cardinalium virtutum* in naturâ; et quod etiam harum historia, antequam ad opus interpretationis ventum fuerit, perscribenda esset; hujus rei minime obliti sumus; *sed eam nobis ipsis reservavimus;* cum de aliorum industriâ in hâc re, priusquam homines cum naturâ paulo arctius consuescere inceperint, prolixe spondere non audeamus."

Compare these announcements with the following passage in the preface to the fragment before us. "Atque a phænomenis æthcris ordiri solennius foret. Nos autem, nil dc severitate instituti nostri remittentes, ea antefcremus quæ naturam con-

stituant et referant magis communem, cujus uterque globus est particeps. Ordiemur vero ab historiâ corporum secundum eam differentiam quæ videtur simplicissima; ea est *copia aut paucitas materiæ intra idem spatium sive eandem circumscriptionem contentæ* et exporrectæ."[1] The subject therefore which stands first in the list of these *cardinal virtues in nature* which, when he published the *Novum Organum*, he meant to reserve for his own pen and handle separately, — namely, the *Historia Densi et Rari* — is the very subject with which this fragment commences; and there need be no doubt that both the title and the præfatio properly belong to it.

There is nothing that I know of to determine the date at which it was written. But there being no allusion to it in the *Commentarius Solutus*, I suppose it was not begun in 1608. And it must certainly have been written before 1622, when the *Historia Ventorum* was published; for then the *Historia Densi et Rari* was designed for the second place in the series, not (as here) for the first. The allusion in the last paragraph but one to an instrument recently exhibited in England by certain Batavians, which uttered a musical sound when exposed to the sun, may possibly bring the uncertainty within narrower limits; if the date of that exhibition can be ascertained. But in the meantime we cannot be far wrong in placing the fragment here.

Another copy of it, much enlarged and improved in the latter part, though very imperfect and apparently of earlier date in the beginning, was published by Dr. Rawley in 1658. This has already been printed in its place, with Mr. Ellis's preface and notes, to which the reader is referred.

J. S.

[1] See p. 688. at the bottom.

PHÆNOMENA UNIVERSI;

SIVE

HISTORIA NATURALIS AD CONDENDAM PHILOSOPHIAM.

PRÆFATIO.

Cum nobis homines nec opinandi nec experiendi vias tenere prorsus videantur, omni ope huic infortunio subveniendum putavimus. Neque enim major aliunde se ostendit bene merendi ratio, quam si id agatur, ut homines, et placitorum larvis et experimentorum stuporibus liberati, ipsi cum rebus magis fida et magis arcta inita societate contrahant, quasi per experientiam quandam literatam. Hoc enim modo intellectus et in tuto et in summo collocatur, atque præsto insuper erit atque ingruet rerum utilium proventus. Atque hujus rei exordia omnino a Naturali Historia ducenda sunt; nam universa philosophia Græcorum, cum sectis suis omnigenis, atque si qua alia philosophia in manibus est, nobis videtur super nimis angustam basin naturalis historiæ fundata esse, atque ex paucioribus quam par erat pronuntiasse. Arreptis enim quibusdam ab experientia et traditionibus, neque iis interdum aut diligenter examinatis [1], reliqua in meditatione et ingenii agitatione posuere, assumpta in majorem rei fiduciam Dialectica. Chymistæ autem et universum mechanicorum et empiricorum genus, si et illis contemplationes et philosophiam tentare audacia creverit, paucarum rerum accuratæ subtilitati assueti, miris modis reliquas ad eas contorquent; et placita magis deformia et monstrosa, quam rationales illi producunt. Illi enim parum ex multis, hi rursus multum ex paucis, in philosophiæ materiam sumunt; utriusque autem ratio, si verum dicendum sit, infirma est et perdita. Sed naturalis historia quæ hactenus congesta est primo intuitu copiosa videri possit, cum re vera sit egena et inutilis, neque adeo ejus generis quod quærimus. Neque enim a fabulis et deliriis

[1] So in the original; a clause having apparently dropped out: such as, *aut certo compertis notionibus*, or words to that effect. Compare *Nov. Org.* l. 62.

purgata est, et in antiquitatem et philologiam et narrationes supervacuas excurrit; circa solida negligens et fastidiosa, curiosa et nimia in inanibus. Pessimum autem est in hac copia, quod rerum naturalium inquisitionem amplexa est, rerum autem mechanicarum magna ex parte aspernata. Atque hæ ipsæ ad naturæ sinus excutiendos longe illis præstant; natura enim sponte sua fusa et vaga disgregat intellectum, et varietate sua confundit; verum in mechanicis operationibus contrahitur judicium, et naturæ modi et processus cernuntur, non tantum effecta. Atque rursus universa mechanicorum subtilitas citra rem quam quærimus sistitur. Artifex enim operi et fini suo intentus ad alia (quæ forsan ad naturæ inquisitionem magis faciunt) nec animum erigit nec manum porrigit. Itaque magis exquisita cura opus est, et probationibus electis, atque sumptu etiam, ac summa insuper patientia. Illud enim in experimentalibus omnia perdidit, quod homines etiam a principio fructifera experimenta, non lucifera, sectati sunt; atque ad opus aliquod magnificum educendum omnino incubuere, non ad pandenda Oracula Naturæ, quod opus operum est, et omnem potestatem in se complectitur. Intervenit et illud ex hominum curiositate et fastu, quod ad secreta et rara se plerunque converterunt, et in his operam et inquisitionem posuerunt, spretis experimentis atque observationibus vulgatis; quod videntur fecisse, aut admirationem et famam captantes, aut in eo lapsi et decepti, quod philosophiæ officium in accommodandis et reducendis rarioribus eventibus ad ea quæ familiariter occurrunt, non æque in ipsarum illarum vulgarium rerum causis et causarum causis altioribus eruendis, situm esse existimarunt. Universæ autem hujus de naturali historia querelæ causa ea præcipua est, quod homines non in opere tantum, sed in ipso instituto aberrarunt. Namque historia illa naturalis, quæ extat, aut ob ipsorum experimentorum utilitatem aut ob narrationum jucunditatem confecta videtur et propter se facta, non ut philosophiæ et scientiis initia et veluti mammam præbeat. Itaque huic rei pro facultate nostra deesse nolumus. Nobis enim quantum philosophiis abstractis sit tribuendum, jampridem constitutum est. Etiam vias Inductionis veræ et bonæ, in qua sunt omnia, tenere nos arbitramur, et intellectus humani versus scientias facultatem incompetentem et prorsus imparem, veluti per machinas aut filum aliquod labyrinthi, posse juvare. Neque nescii sumus, nos, si instaurationem illam scientiarum quam in animo habemus intra inventa ulla majora cohibere voluisse-

mus, ampliorem fortasse honoris fructum percipere potuisse. Verum cum nobis Deus animum indiderit qui se rebus submittere sciat, quique ex meriti conscientia et successus fiducia speciosa libens prætereat; eam etiam partem operis nobis desumpsimus, quam existimamus alium quemquam aut in universum fugere, aut non pro instituto nostro tractare voluisse. Circa hoc autem duo sunt, de quibus homines et alias, et nunc præcipue cum ad rem ipsam accingimur, monitos volumus. Primo, ut mittant illam cogitationem, quæ facile hominum mentes occupat et obsidet, licet sit falsissima et perniciosissima, eam videlicet, quod rerum particularium inquisitio infinitum quiddam sit et sine exitu: cum illud verius sit, opinionum et disputationum modum nullum esse, sed phantasias illas ad perpetuos errores et infinitas agitationes damnari; particularia autem et informationes sensus (demptis individuis et rerum gradibus, quod inquisitioni veritatis satis est) comprehensionem pro certo, nec eam sane vastam aut desperatam, patiuntur. Secundo, ut homines subinde meminerint quid agatur, atque cum inciderint in complures res vulgatissimas, exiles, ac specie tenus leves, etiam turpes, et quibus (ut ait ille) honos præfandus sit, non arbitrentur nos nugari, aut mentem humanam inferius quam pro dignitate sua deprimere. Neque enim ista propter se quæsita aut descripta sunt, sed nulla prorsus alia patet intellectui humano via, neque ratio operis aliter constat; nos siquidem conamur rem omnium maxime seriam et humana mente dignissimam, ut lumen naturæ purum et minime phantasticum (cujus nomen hactenus quandoque jactatur, res hominibus penitus ignota est), per facem a divino numine præbitam et admotam, hoc nostro seculo accendatur. Neque enim dissimulamus nos in ea opinione esse, præposteram illam argumentorum et meditationum subtilitatem, primæ informationis sive veræ inductionis subtilitate et veritate suo tempore prætermissa aut non recte instituta, rem in integrum restituere nullo modo posse, licet omnia omnium ætatum ingenia coierint; sed naturam, ut fortunam, a fronte capillatam, ab occipitio calvam esse. Restat itaque ut res de integro tentetur, idque majoribus præsidiis; atque exutis opinionum zelis detur aditus ad regnum philosophiæ et scientiarum (in quo opes humanæ sitæ sunt, natura enim nonnisi parendo vincitur), qualis patet ad regnum illud cœlorum, in quod nisi sub persona infantis ingredi non licet: usum autem hujus operis plebeium illum et promiscuum

ex experimentis ipsis omnino non contemnimus (cum et notitiæ et inventioni hominum, pro varietate artium et ingeniorum, plurima utilia proculdubio suggerere possit); attamen minimum quiddam esse censemus, præ eo aditu ad scientiam et potentiam humanam, quem ex misericordia divina speramus. A qua etiam supplices iterum petimus, ut novis eleemosynis per manus nostras familiam humanam dotare dignetur.

Natura rerum aut libera est, ut in Speciebus, aut perturbata, ut in Monstris, aut constricta, ut in Experimentis Artium; facinora autem ejus cujuscunque generis digna memoratu et historia. Sed Historia Specierum, quæ habetur, veluti plantarum, animalium, metallorum et fossilium, tumida est et curiosa; Historia Mirabilium, vana et e rumore; Historia Experimentorum manca, tentata per partes, tractata negligenter, atque omnino in usum practicæ, non in usum philosophiæ. Nobis itaque stat decretum, historiam specierum contrahere, historiam mirabilium excutere atque expurgare; præcipuam autem operam in experimentis mechanicis et artificialibus, atque naturæ erga manum humanam obsequiis collocare. Quid enim ad nos lusus naturæ et lascivia? hoc est, pusillæ speciérum ex figura differentiæ, quæ ad opera nil faciunt; in quibus nihilominus naturalis historia luxuriatur. Mirabilium autem cognitio grata certe nobis, si expurgata et electa sit; sed quamobrem tandem grata? Non ob ipsam admirationis suavitatem, sed quod sæpe artem officii sui admonet, ut naturam sciens eo perducat, quo ipsa sponte sua nonnunquam præivit. Omnino primas partes ad excitandum lumen naturæ artificialibus tribuimus; non tantum quia per se utilissima, sed quia naturalium fidissimi interpretes. Num forte fulguris aut iridis naturam tam clare explicasset quisquam, antequam per tormenta bellica, aut artificiosa iridum super parietem simulacra, utriusque ratio demonstrata esset? Quod si causarum fidi interpretes, etiam effectorum et operum certi et felices indices erunt. Neque tamen consentaneum putamus ex triplici ista partitione historiam nostram distrahere, ut singula seorsim tractentur, sed genera ipsa miscebimus, naturalia artificialibus, consueta admirandis adjungentes, atque utilissimis quibusque maxime inhærentes.

Atque a phænomenis ætheris ordiri solennius foret. Nos autem nil de severitate instituti nostri remittentes, ea anteferemus quæ naturam constituunt et referunt magis com-

munem, cujus uterque globus est particeps. Ordiemur vero ab historia corporum, secundum eam differentiam, quæ videtur simplicissima; ea est copia aut paucitas materiæ intra idem spatium, sive eandem circumscriptionem, contentæ et exporrectæ. Nam cum ex pronuntiatis de natura nil verius sit quam propositio illa gemella, *ex nihilo nihil fieri, neque quicquam in nihilum redigi*, sed quantum ipsum naturæ, sive materiæ summam universalem, perpetuo manere et constare, et neutiquam augeri aut minui. Etiam illud non minus certum, tamctsi non tam perspicue notatum aut assertum sit (quicquid homines de potentia materiæ æquabili ad formas fabulentur), ex quanto illo materiæ, sub iisdem spatiorum dimensionibus plus et minus contineri, pro corporum diversitate a quibus occupantur; quorum alia magis compacta, alia magis extensa sive fusa, evidentissime reperiuntur. Neque enim parem materiæ portionem recipit vas aut concavum aqua et aëre impletum; sed illud plus, istud minus. Itaque si quis asserat, ex pari aëris contento par aquæ contentum effici posse; idem est ac si dicat aliquid fieri posse ex nihilo. Nam quod deesse supponitur ex materia, id ex nihilo suppleri necesse foret. Rursus si quis asserat, par contentum aquæ in par contentum aëris posse verti, idem est ac si dicat aliquid posse redigi in nihilum. Nam quod superesse supponitur ex materia, id ad nihilum evanuisse similiter necesse foret. Neque nobis dubium est, quin hæc res etiam calculos pati possit, surdos fortasse in aliquibus, sed definitos et certos, et naturæ notos. Veluti si quis dicat auri corpus collatum ad corpus spiritus vini, esse coacervationem materiæ superantem ratione vicecupla simpla aut circiter, non erraverit. Itaque exhibituri jam historiam eam quam diximus de copia et paucitate materiæ, atque de materiæ coitione atque expansione, ex quibus notiones illæ Densi et Rari (si proprie accipiantur) ortum habent, hunc ordinem servabimus, ut primo corporum diversorum (ut auri, aquæ, olei, aëris, flammæ) rationes ad invicem recenseamus. Examinatis autem rationibus corporum diversorum, postea unius atque ejusdem corporis subingressus et expatiationes cum calculis sive rationibus memorabimus. Idem enim corpus etiam absque accessione aut ablatione, aut saltem minime pro rata contractionis et extensionis, ex variis impulsibus tum externis tum internis, sustinet se congerere in majorem et minorem sphæram. Interdum enim luctatur corpus, et in veterem sphæram se restituere nititur,

interdum plane transmigrat, nec revertere satagit. Hic cursus primo atque differentias et rationes corporis alicujus naturalis (quoad extentum) collati cum aperturis aut clausuris suis memorabimus; videlicet cum pulveribus suis, cum calcibus suis, cum vitrificationibus suis, cum dissolutionibus suis, cum distillatis suis, cum vaporibus et auris, exhalationibus, et inflammationibus suis memorabimus; deinde actus ipsos et motus, et progressus et terminos contractionis et dilatationis proponemus, et quando se restituant corpora, quando transmigrent secundum extentum; præcipue autem efficientia et media, per quæ hujusmodi corporum contractiones et dilatationes sequuntur, notabimus; atque interim virtutes et actiones, quæ corpora ex hujusmodi compressionibus et dilatationibus induunt et nanciscuntur, obiter subtexemus. Cumque probe noverimus quam difficilis res sit, in præsenti animorum statu, jam ab ipso principio cum natura consuescere, observationes nostras ad attentionem hominum et meditationem excitandam et conciliandam adjiciemus. Quod ad demonstrationem autem attinet, sive retectionem densitatis et raritatis corporum, nil dubitamus aut cunctamur quin quoad corpora crassa et palpabilia, *motus gravitatis* (quem vocant) loco optimæ et maxime expeditæ probationis sumi possit; quo enim corpus compactius, eo gravius. Verum postquam ad gradum aëreorum et spiritualium ventum est, tum profecto a lancibus destituimur, atque alia nobis industria opus erit. Incipiemus autem ab *Auro*, quod omnium quæ habemus (neque enim tam adulta est philosophia, ut de visceribus terræ statuere debeamus), gravissimum est, atque plurimum materiæ minimo spatio complectitur, atque ad hujus corporis sphæram reliquorum rationes applicabimus; illud monentes, historiam ponderum hic nos minime tractare, nisi quatenus ad corporum spatia sive dimensa demonstranda lucem præbeat. Cum vero non conjicere et ariolari, sed invenire et scire nobis propositum sit, hoc autem in examine et probatione experimentorum primorum magnopere positum esse judicemus, prorsus decrevimus in omni experimento subtiliore modum experimenti quo usi sumus aperte subjungere: ut postquam patefactum sit quomodo singula nobis constiterint, videant homines et quatenus fidem adhibeant, et quid ulterius faciendum sit, sive ad errores corrigendos qui adhærere possint, sive ad excitandas atque ad operandas probationes magis fidas et exquisitas. Quin et ipsi de iis quæ nobis minus explorata atque errori magis ex-

posita et quasi finitima videbuntur, sedulo et sincere monebimus. Postremo observationes nostras (ut modo diximus) adjiciemus, ut licet omnia integra philosophiæ servemus, tamen faciem ipsam historiæ naturalis etiam in transitu versus philosophiam obvertamus. Atque porro illud curabimus, ut quæcunque ea sint sive experimenta sive observationes, quæ præter scopum inquisitionis occurrunt atque interveniunt, et ad alios titulos proprie pertinent, notemus, ne inquisitio confundatur.

TABULA COITIONIS ET EXPANSIONIS MATERIÆ PER SPATIA IN TANGIBILIBUS, CUM SUPPUTATIONE RATIONUM IN CORPORIBUS DIVERSIS.

Idem spatium occupant, sive æque exporriguntur,

		Den.	Gr.
1	Auri puri uncia, sive	20	0
2	Argenti vivi	19	9
3	Plumbi	12	1½
4	Argenti puri	10	21
5	Plumbi cinerei; anglice *tinglass*	10	13
6	Cupri	9	8
7	Aurichalchi	9	5
8	Chalybis	8	10
9	Æris communis	8	9
10	Ferri	8	6
11	Stanni	7	22
12	Magnetis	5	12
13	Lapidis Lydii	3	1
14	Marmoris	2	22¾
15	Silicis	2	22½
16	Vitri	2	20½
17	Crystalli	2	18
18	Alabastri	2	12
19	Salis gemmæ	2	10
20	Luti communis	2	8½
21	Luti albi	2	5½
22	Nitri	2	5
23	Ossis bovis	2	5
24	Pulveris margaritarum	2	2
25	Sulphuris	2	2
26	Terræ communis	2	1½
27	Vitrioli albi	1	22
28	Eboris	1	21½
29	Aluminis	1	21
30	Olei vitrioli	1	21
31	Arenæ albæ	1	20
32	Cretæ	1	18½
33	Olei sulphuris	1	18
34	Salis communis	1	10
35	Ligni vitæ	1	10
36	Carnis ovillæ	1	10
37	Aquæ fortis	1	7
38	Cornu bovis	1	6
39	Balsami Indi	1	6
40	Ligni santal. rubei	1	5
41	Gagatis	1	5
42	Cepæ recentis in corpore	1	5
43	Caphuræ	1	4
44	Radicis caricæ recentis	1	4
45	Ligni ebeni	1	3½
46	Sem. fæniculi dulcis	1	3½
47	Succini lucidi	1	3
48	Aceti	1	3½
49	Agressæ ex pomis acerbis	1	3
50	Aquæ communis	1	3 paul. min.
51	Urinæ	1	3
52	Olei caryophyllorum	1	3 paul. min.
53	Vini clareti	1	2¾
54	Sacchari albi	1	2½
55	Ceræ flavæ	1	2
56	Radicis Chinæ	1	2

		Den.	Gr.
57	Carnis pyri brumalis crudi	1	2
58	Aceti distillati . .	1	1
59	Aquæ rosaceæ dis-llatæ	1	1
60	Cineris communis .	1	0½
61	Beniovis . . .	1	0
62	Myrrhæ . . .	1	0
63	Butyri	1	0
64	Adipis . . .	1	0
	Olei amygdalini dulcis	0	23½[1]
	Olei maceris viridis expressi	0	23½
	Herbæ sampsuchi .	0	22
	Petrolei . . .	0	23
	Florum rosæ . .	0	22
	Spiritus vini . .	0	22
	Ligni quercus . .	0	19½
	Fuliginis communis et camino pressi.	0	17
	Ligni abietis . .	0	15

Modus experimenti circa tabulam suprascriptam.

INTELLIGANTUR pondera quibus usi sumus ejus generis et computationis, quibus aurifabri utuntur, ut libra capiat uncias 12, uncia viginti denarios, denarius grana 24. Delegimus autem corpus auri, ad cujus exporrectionis mensuram reliquorum corporum rationes applicaremus, non tantum quia gravissimum, sed quia maxime unum et sui simile. Reliqua enim corpora quæ quiddam continent volatilis, etiam ignem passa varietatem retinent ponderis et spatii; sed aurum depuratum eam plane exuisse videtur, atque ubique simile esse. Experimentum vero hujusmodi erat. Unciam auri puri in figuram aleæ sive cubi efformavimus; dein vasculum quadratum paravimus, quod corpus illud auri caperet, atque ei exacte conveniret, nisi quod esset nonnihil altius; ita tamen ut locus intra vasculum quo cubus ille auri adscenderat linea conspicua signaretur. Id fecimus liquorum gratia, ut cum liquor aliquis intra idem vasculum immittendus esset, ne diffluerent; atque hoc modo justa mensura commodius servari posset. Simul autem aliud vasculum fieri fecimus, quod cum altero illo, pondere et contento prorsus par esset; ut in pari vasculo corporis contenti tantum ratio appareret. Tum cubos ejusdem magnitudinis sive dimensi fieri fecimus, in omnibus materiis in Tabula specificatis quæ sectionem pati possent; liquoribus vero ex tempore usi sumus, implendo scilicet vasculum quousque liquor ad locum illum signatum adscenderet; pulveres eodem modo; sed intelligantur pulveres maxime et fortiter compressi. Hoc enim potissimum ad æquationem pertinet, nec casum recipit. Itaque non alia fuit probatio, quam ut unum ex vasculis vacuum

[1] *Den.* 1. *gran.* 23. *D.* in the original; a misprint, no doubt. Compare Vol. II. p. 246.

cum uncia in una lance, alterum ex vasculis cum corpore in altera parte poneretur, et ratio ponderis exciperetur; quod quanto esset diminutum, tanto dimensum ejusdem corporis intelligitur auctum. Exempli gratia, cum auri cubus det unciam unam, adipis vero denarium unum; liquet exporrectionem corporis auri, collatam ad exporrectionem corporis adipis, habere rationem vicecuplam. Mensuræ autem ejus quæ unciam auri capiebat, modum etiam excipere et notare visum est; ea erat pintæ vinariæ, qualis apud nos Anglos in usu est, pars 269 paulo minus. Probatio vero talis erat. Pondus aquæ quod intra vasculum sub illa linea continebatur notavimus, ac tum pondus aquæ intra pintam contentum similiter notavimus, et ex rationibus ponderum rationes mensurarum collegimus.

Monita.

Videndum num forte contractio corporis arctior ex vi unita nanciscatur majorem rationem ponderis, quam pro quantitate materiæ; id utrum fiat necne ex historia propria ponderis constabit. Quod si fiat, fallit certe supputatio; et quo corpora sunt extensiora, eo plus habent materiæ quam pro calculo ponderis et mensuræ, quæ ex eo pendet.

2. Parvitas vasis quo usi sumus, et forma etiam (licet ad cubos illos recipiendos habilis et apta), ad rationes exquisitas verificandas minus propria fuit. Nam nec minutias infra grani dimidium et quadrantem facile excipere licebat, et quadrata illa superficies in parvo nec sensibili adscensu sive altitudine notabilem ponderis differentiam trahere potuit, contra quam fit in vasis in acutum surgentibus.

3. Minime dubium est etiam complura corpora quæ in Tabula ponuntur, intra suam speciem magis et minus recipere quoad pondera et dimensa. Nam et aquæ et vina, et similia, sunt certe alia aliis graviora. Itaque quoad calculationem exquisitam casum quendam ista res recipit; neque ea individua in quæ experimentum nostrum incidit naturam speciei exacte referre, neque cum aliorum experimentis fortasse omnino in minimis consentire possunt.

4. In Tabulam superiorem conjecimus ea corpora, quæ spatium sive mensuram commode implere corpore integro et tanquam similari possent, quæque etiam pondus habeant, ex cujus rationibus de materiæ coacervatione judicium faciamus. Itaque tria genera corporum huc retrahi non poterant. Primo,

ea quæ dimensioni cubicæ satisfacere non poterant, ut folia, flores, pelliculæ, membranæ. Secundo, corpora inæqualiter cava et porosa, ut spongiæ, suber, vellera. Tertio, pneumatica pondere non dotantur.

Observationes.

Coacervatio materiæ in corporibus tangibilibus, quæ ad nostram notitiam pervenerunt, intra rationes partium 21 vel circiter vertuntur. Coacervatio enim maxime compacta invenitur in auro, maxime expansa in spiritu vini (ex corporibus dicimus quæ unita sunt, nec evidenter porosa). Namque spiritus vini occupat spatium vicies et semel repetitum, quod occupat aurum, juxta rationes unciæ unius ad grana 22. Ex 21 enim illis partibus, quibus corpora alia aliis sunt magis compacta, 13 partes occupant metalla; nam stannum, quod metallorum est levissimum, ponderis est denar. fere 8, quod decrevit infra pondus auri denariis 13. Omnigena autem illa varietas, postquam a metallis decessimus, intra 8 illas reliquas partes clauditur; ac rursus insignis illa varietas, quæ incipiendo a lapidibus inclusive ad alia illa protenditur, intra tres tantum partes aut non multo plus cohibetur. Nam lapis Lydius, qui est ex lapidibus gravissimus (excepto magnete), parum denariis 3 præponderat. Spiritus autem vini, qui est terminus levitatis in corporibus unitis, denario uno paulo levior est.

Videtur saltus magnus sive hiatus ab auro et argento vivo ad plumbum; scilicet a 20 denariis et paulo minus ad 12. Atque licet metallica magna varietate exuberent, vix tamen existimamus in hoc hiatu multa inveniri corpora media, nisi sint prorsus rudimenta argenti vivi. A plumbo autem gradatim adscenditur ad ferrum et stannum. Rursus alterum magnum hiatum sive saltum invenimus inter metalla et lapides; scilicet ab 8 denariis ad tres; tantum enim aut circiter a stanno distat ad lapidem Lydium. Solummodo inter hæc se interponit, et fere ex æquo, magnes, qui est lapis metallicus; atque existimamus inveniri et alia fossilia misturæ imperfectæ, et compositæ naturæ inter metallum et lapides. A lapidibus certe ad reliqua parvis intervallis proceditur.

In vegetabilibus autem minime dubitamus, ac etiam in partibus animalium, se ostendere quam plura corpora etiam satis æqualis texturæ, quæ spiritum vini levitate superent. Namque etiam lignum quercus, quæ videtur esse ex lignis robustis et

solidis, spiritu vini est levius; et lignum abietis adhuc magis. Florum autem et foliorum plurima, et membranæ et pelliculæ, ut spolia serpentum et alæ insectorum, et similia, proculdubio ad minores rationes ponderum (si dimensionem illam cubicam capere possent) accederent, ac multo magis artificialia, ut papyrus, linteus pannus extinctus (quali ad fomites flammarum utimur), folia rosarum quæ supersunt a distillatione, et hujusmodi.

Reperimus plerunque in partibus animalium corpora nonnulla magis compacta quam in plantis. Ossa enim et carnes magis sunt compacta quam ligna et folia. Cohibenda ac etiam corrigenda est illa cogitatio, in quam animus humanus propendet; compacta nimirum quæque et maxime solida, esse durissima et consistere maxime; fluido vero adesse naturam minus contractam. Nam coacervatio materiæ non minor est in corporibus quæ fluunt, quam in iis quæ consistunt, sed major potius. Siquidem aurum mollitie quadam vergit ad fluorem, atque cum liquescit neutiquam extenditur, sed priore spatio continetur. Et argentum vivum ex se fluit, et plumbum facile fluit, ferrum ægre, quorum alterum ex gravissimis metallis est, alterum ex levissimis. Sed illud præcipuum, quod generaliter metalla lapides (fluida videlicet corpora, fragilia) pondere longe superent.[1]

Accidit auro et argento vivo, quæ ex metallis reliquis tanto sunt graviora, res mira; nempe ut reperiantur quandoque in granis et parvis portionibus quasi a natura perfecta, et fere pura; quod nulli fere aliorum metallorum contingit, quæ necesse habent ut per ignem purgentur et coëant; cum tamen hæc duo, quorum coitio longe maxima est et verissima, id a natura quandoque absque ignis beneficio consequantur.

In inquisitione de re metallica ac de natura lapidum, attendatur parum quæ sint ea metalla, quæ solent esse cæteris depressiora, et magis in profundo sita, si quæ hujus rei norma sit et experimentum constans; in quo tamen ipso ratio habenda est regionis in qua fodinæ sunt, an ipsa fuerit terra alta, an terra humilis. Similiter de lapidibus et gemmis, crystallis, an natura lapidea penetret terram tam profunde quam metallica, an potius in superficie hæreat, quod magis existimamus.

Sulphur, quem patrem metallorum esse communis est opinio, licet a peritioribus fere repudiata, aut ad sulphurem quendam naturalem non communem translata, habet coacervationem

[1] In the original *fragilia* is not included within the parenthesis; obviously by mistake.

materiæ, omni metallo, etiam lapidibus et terris robustioribus, inferiorem; scilicet denariorum 2 et granorum 2; neque id tamen obstat (si cætera convenirent) quin cum mercurio confusum, propter ejusdem eximiam gravitatem, pondera omnium metallorum pro ratione temperamenti reddere posset, præter pondus auri.

Efficiens coitionis in corporibus ad coacervationem non semper spectatur. Nam vitrum, quod coit per ignem acrem et fortem, præponderat crystallo, quod nativum est et educitur sine igne aut evidenti calore (nam quod glacies sit concreta, id populare est) atque ipsum crystallum longe ponderosius est[1] [glacie], quæ manifeste a frigore cogitur, ac tamen aquæ supernatat.

Mixtura liquorum ex rationibus ponderum solummodo non pendet aut procedit, siquidem spiritus vini cum oleo amygdalarum expresso non miscetur; sed (quod quis fortasse non putaret) supernatat oleo, quemadmodum oleum supernatat aquæ; et tamen grano tantum et dimidio (ut in Tabula conspicitur) levior est. At idem spiritus vini aquæ licet graviori longe facilius miscetur; ut et aqua ipsa rursus facilius miscetur cum oleo vitrioli, quam cum oleo amygdalarum; et tamen oleum vitrioli aqua est granis 18 gravius; oleum amygdalarum vero tantum granis 4 levius. Neque hoc accipiendum est, quin in corporibus proportionatis ad mixturam præcipua sit ponderis ratio. Nam videmus vinum aquæ supernatare, si cohibeatur agitatio, vel primi casus sive descensus perturbatio; veluti cum in vase ubi continetur aqua vinum superinfunditur, sed mediante offa panis vel linteo, quod vim ipsam casus primi frangat. Atque idem in aqua super oleum vitrioli cum hac industria infusa usu venit. Atque quod magis est, licet vinum infundatur prius, et aqua posterius (super offam, vel per pannum ut dictum est), invenit locum suum, et permeat per vinum, et in fundo se colligit.

Continuatio Historiæ Coitionis et Expansionis Materiæ in Corpore Eodem.

Rationes pulverum majore cum utilitate inquiri si fiat collatio eorum cum corporibus ipsorum integris, quam si poneren-

[1] Some word is evidently wanting in the original. Mr. Montagu omits the parenthesis, puts a semicolon after *calore*, and inserts *ea* after *crystallum*. But I think the insertion of *glacie* gives a better sense.

tur per se et simpliciter, judicavimus. Hoc enim modo et de corporum diversitate et de arctissimis illis naturæ integralis nexibus et vinculis judicium fieri et rationes iniri posse animum advertimus. Intelligimus autem in rationibus pulverum, pulveres fortiter et maxime pressos. Hoc enim facit ad æquationem, nec recipit casum.

Mercurius in corpore habet in mensura illa experimentali secundum quam Tabula ordinatur, denar. 19, grana 9; sublimatus vero in pulvere habet denar. 3, gran. 22.

Plumbum in corpore denar. 12, gran. 1 dimid. In cerussa vero in pulvere denar. 4, gran. 8 dimid.

Chalybs in corpore denar. 8, gran. 10. In pulvere præparato (quali ad medicinas utimur) denar 2, gran. 9.

Crystallum in corpore denar. 2, gran. 18. In pulvere denar. 1. gran. 20.

Santalum rubeum in corpore denar. 1, gran 5 dimid. In pulvere gran. 16 dimid.

Lignum quercus in corpore gran. 19 dimid. In cinere denar. 1, gran. 2.

Ut autem melius intelligantur rationes pulveris pressi et non pressi, idque pro diversitate corporum, nos pondus rosarum, quod integraliter in Tabulam recipi non poterat, in pulvere excepimus; illud in pulvere non presso dabat gran. 7, in pulvere presso gran. 22: sed idem in ligno santali rubei experti, santalum rubeum in pulvere non presso gran. 10, in pulvere presso gran. 16 dimid. dare comperimus; ut sit pulvis rosæ pulvere santali, si non premantur, multo levior, si premantur, gravior. Etiam ad supplementum Tabulæ prioris rationes pulveris excepimus in aliquo ex floribus, ex herbis, et ex seminibus (nam radicum dimensio cubica esse poterat), ad exemplum reliquorum in sua specie; ac invenimus pulverem floris rosæ, ut superius dictum est, dare gran. 22, herbæ sampsuchi gran. 23, seminis fœniculi dulcis denar. 1, gran. 3 dimid. Etiam aliorum corporum, quæ in Tabula recipi non poterant, pondera in pulveribus excepimus, ut arenæ albæ. Hæc dabat denar. 1, gran. 20. Salis communis, qui dat denar. 1, gran. 10. Sacchari, quod dat. denar. 1, gran. 2 dimid. Myrrhæ, quæ dat denar. 1. Biniorum, quæ dant denar. 1. Conspicere autem est in ipsa Tabula sulphur in corpore dare denar. 2, gran. 2: in oleo chymico denar. 1, gran. 18. Vitriolum autem in corpore denar. 1, gran 22; in oleo denar. 1, gran. 21. Vinum in corpore dare denar. 1, gran. 2 d. qu. in

distillato gran. 22. Acetum in corpore dare denar. 1, gran. 2. d. in distillato denar. 1, gran. 1.

Monita.

Quando dicimus pondus in corpore, pondus in pulvere, non intelligimus de eodem individuo, sed de corpore et pulvere ejusdem speciei, intra eandem illam mensuram tabularem contento. Nam si lignum quercus accipiatur, et idem lignum in individuo in cinerem redigatur; et plurimum de pondere deperdit, et cinis ille mensuram ligni ex magna parte non implet.

Modus versionis corporis in pulverem ad apertionem sive expansionem corporis multum facit. Alia enim est ratio pulveris qui fit per simplicem contusionem sive limaturam: alia ejus qui per distillationem, ut sublimati: alia ejus qui per aquas fortes et erosionem vertendo tanquam in rubiginem: alia ejus qui per exustionem, ut cinis, calx. Itaque ista cum ad contemplationem adhibeantur, æquiparari nullo modo debent.

Nos in singulis diutius quam pro instituti nostri ratione morari non possumus, et tamen quæ præstare non licet designare juvat; ea demum foret Tabula exacta corporum cum suis aperturis, quæ corpora singula cum pulveribus suis, cum calcibus suis, cum vitrificationibus suis, cum dissolutionibus suis, cum distillatis suis conferret.

Historiam variationis ponderum in individuis, id est ejusdem corporis integri et pulverizati, ut ejusdem aquæ in nive aut glacie, et solutæ ejusdem [1], ovi crudi et cocti, ejusdem pulli vivi et mortui, et similium, ad historiam propriam ponderum rejicimus.

Observationes.

In corporibus magis compactis longe arctior est compactio partium, quam ulla pulverum suorum positione aut pressura æquari potest. Et quo corpora sunt graviora et solidiora, eo major differentia redundat inter integra sua et aperturas suas, ut ratio argenti vivi crudi ad sublimatum in pulvere est quintupla et amplius; rationes chalybis et plumbi non adscendunt ad quadruplam; rationes crystalli et santali non adscendunt ad duplam.

[1] So in the original. A word appears to have dropped out and the punctuation to have been disturbed. Bacon probably wrote *ut ejusdem aquæ in nive aut glacie* fixæ *et solutæ, ejusdem ovi crudi et cocti*, &c.

In corporibus levioribus et porosis laxior fortasse est partium positura in integris quam in pulveribus pressis, ut in foliis siccis rosarum. Atque in hujusmodi corporibus, major intercedit differentia inter pulveres suos pressos et non pressos.

Pulverum partes ita se sustentare possunt, ut pulvis non pressus triplicem impleat mensuram ad pulverem pressum.

Corpora metallica, ut sulphur, vitriolum, in olea (quæ vocant) conversa, pondus eximie retinent, nec magnum intercedit discrimen inter olea et ipsa corpora.

Destillata proculdubio attenuantur et pondere decrescunt; sed hoc facit vinum duplo plus quam acetum.

Dignissima observatione est insignis illa apertura in pulvere sublimati, ad corpus crudum, hoc nomine, quod licet tanta sit (quintupla enim est, ut diximus) idque in corpore non transeunte, ut in vaporibus argenti vivi, sed consistente, tamen tam parvo negotio rursus coit ad veterem sphæram.

Continuatio Historiæ Coitionis et Expansionis Materiæ per Spatia in Corpore eodem.

Animalia natando palmis vel pedibus aquam deprimunt, ea ultra naturalem consistentiam depressa et densata resurgit, resurgens corpus grave sublevat et sustinet. Homines vero natandi peritiores corpus suum super aquam ita librare possunt, ut ad tempus absque motu brachiorum vel tibiarum se sustineant; etiam pedibus aquam calcant erecti, et alias agilitates super aquam exercent. Aves certe aquatiles palmipedes sunt, et pedum membranis aquam apte deprimunt; in profundiore autem aqua facilior est natatio.

Aves volando aërem alis verberant et condensant, aër vero (ut superius de aqua dictum est) ad consistentiam suam se restituens avem vehit. Atque aves quoque nonnunquam radunt iter suum expansis, sed immotis, alis, aut subinde alas parum concutiendo, atque iterum labendo. Neque dissimilis est ratio pennatorum et aliorum volatilium. Nam muscæ, et id genus, habent suas alarum tunicas, quibus aërem pulsant. Infirmitas autem alarum parva corporis mole sive pondere compensatur. Etiam in sublimi facilius feruntur alata, præsertim quæ alas habent amplitudine latiores, motu non ita pernices, ut ardea. Atque omnes aves, quæ aliquantæ magnitudinis sunt,

magis laboriose feruntur, cum primum se a terra elevant, ubi scilicet necesse est aërem esse minus profundum.

Monitum.

Motus condensationis in aqua, aut aëre, aut similibus, per verberationem sive impulsionem manifestus est. Is hujusmodi est. Aëris vel aquæ partes, quanto ab impulsu primo seu verbere remotiores sunt, tanto infirmius impetuntur et tardius cedunt; quanto autem propius, tanto fortius et velocius; unde necessario fit, ut anterior aër celerius fugiens posteriorem tardius se expedientem consequatur, atque hoc modo coëant. Postquam autem ex ea coitione major provenerit condensatio quam natura patitur, corpora aquæ vel aëris, ut se aperiant et laxent, resiliunt et revertuntur.

Historia.

Facies aquæ atque omnis fluidi ab agitatione et perturbatione inæqualis est, idque inæqualitate mobili et successiva, quousque aqua debitam recuperet consistentiam, et pressura liberetur; ut in undis maris et fluviorum, etiam postquam venti conciderint, et in omni aqua quovis modo turbata.

Neque dubium est, quin et similis inæqualitas versetur in ventis, qui et ipsi in morem fluctuum se volvunt; neque vel cessante prima violentia se subito recipiunt in tranquillitatem; nisi quod in undulatione aëris non intervenit motus gravitatis, qui in aqua cum motu liberationis a pressura conjungitur.

Lapis super aquam lateraliter jactus (ut pueri ludendo solent) resilit, atque iterum et sæpius cadit, et ab aqua repercutitur. Etiam natantes cum ex loco altiore in aquas se saltu dejiciunt, cavent sibi ne in femorum junctura vi aquæ secentur. Denique aqua manu aut corpore fortiter percussa, ferulæ aut corporis durioris instar verberat, et dolorem incutit. Atque in scaphis et carinis, quæ vi remorum aguntur, aqua remis pone remiges trusa et pressa, non aliter scapham impellit, eamque prolabi et emicare cogit, quam cum conto ad littus posito scapha a littore summovetur. Neque enim ejus rei causa præcipua est aqua pone puppim scaphæ se colligens et scapham in contrarium protrudens, quod ipsum tamen fit a pressura se laxante.

Aër ad evitandam pressuram omnia opera corporis solidi et robusti edit et imitatur, ut fit in ventis, qui naves agunt, arbores, domos evertunt[1], prosternunt, et similia. Etiam non alia vi quam ipsorum anhelitu, cum balista cava et longa quæ aëris compressionem juvet, jaculamur ictu nonnullo.

Pueri ad imitationem tormentorum alnum excavant, et partes radicis iridis aut papyri globulati ad utrumque siphonis finem infarciunt, deinde cum embolo ligneo globulum protrudendo emittunt, globulus autem ulterior emittitur cum sono et impetu, antequam ab embolo ullo modo tangatur, a vi aëris inclusi et compressi.

Aër impulsu densatus frigidior, et magis ad naturam aquæ appropinquans videtur, ut cum flabris ventum facimus, aut concitato gradu aërem impellendo rursus reflantem sentimus, aut ore contracto frigidum spiramus, aut ex follibus ventum emittimus. Quinetiam sub dio ventis flantibus, major fit refrigeratio, quam aëre quieto et placido.

In sonorum generatione aër densatus corporis solidi naturam imitatur; nam quemadmodum inter duo corpora solida percussione sonus generatur, ita etiam inter corpus solidum et aërem densatum fit sonus, et rursus inter aërem densatum et alium aërem ex adverso densatum. Nam in instrumentis musicis cum chordis manifestum est, sonum non emitti ex tactu seu percussione inter digitum vel plectrum et chordam, sed inter chordam et aërem. Chorda enim cum resilit, idque motu celerrimo propter intentionem, aërem primo densat, dein percutit. Instrumenta autem ex spiritu, propter infirmiorem motum spiritus quam chordæ, necesse habent ut forma sint cava et conclusa, ad juvandam compressionem aëris; quod etiam in instrumentis cum chordis juvamenti loco adhibetur.

Aqua arctata et constipata magno impetu se laxat et diffundit in latera, ut latitudinem debitam consequatur, ut sub arcubus pontium. Simili modo et ventus per angustias densatus invalescit et furit. Adversi autem gurgites aquarum turbines aquarum generant vorticosos, ut quoniam debita relaxatio fieri non potest, singulæ partes pressuram ex æquo tolerent.

Aqua ex angustiis subito violenter emissa corporis continui, veluti fili aut virgæ aut trunci, imaginem refert, et fit primum directa, post arcuata, deinde se scindit, et in guttas hinc illinc in orbem se dispertit, ut in fistulis sive syringis et impluviis.

[1] So in the original. It should probably be *arbores evertunt, domos prosternunt.*

Est genus turbinis in paludibus non infrequens, præsertim post fœnum demessum, aut saltem ex ea occasione se conspiciendum præbens. Iste typhon quandoque cumulum fœni in aërem sublevat, et ad tempus fere unitum et non multum dispersum evehit, donec postquam ad altitudinem magnam evectum sit, fœnum conopei instar distendat et spargat.

Catinum ligneum vacuum versum, et ad superficiem aquæ æqualiter appositum, et postea sub aquam demersum, secum portat usque ad fundum vasis aërem universum qui antea in catino continebatur: quod si cum simili æquilibrio rursus ex aqua educatur, invenias aërem in non multo minus spatium quam antea implebat se recepisse, quod ex coloratione labri catini ad locum quo aqua adscenderat, et a quo introrsum aër se receperat, manifestum erit.

In cubiculo ubi ventus flarit aperta fenestra, si non detur exitus ex aliqua alia parte, ventus, nisi vehemens fuerit, non admodum sentitur, cum a corpore aëris quod cubiculum impleverat et sub primo flatu nonnihil densatum fuerat, et amplius densari recusat, non recipiatur; dato autem exitu tum demum manifesto sentitur.

Ad commodiorem moram operariorum qui sub aqua opus aliquod moliuntur et peragunt, excogitatum fuit, ut dolium quoddam instar alvei pararetur, ex metallo sive aliqua materia quæ fundum peteret, id tripode sustineretur pedibus ad labrum dolii affixis, qui pedes essent altitudinis minoris quam staturæ hominis. Dolium istud in profundum demittebatur, cum universo quem continebat aëre, eo modo quo de catino dictum est, et in pedes suos plantabatur et stabat juxta locum ubi opus faciendum esset. Urinatores autem, qui iidem erant operarii, cum sibi respiratione opus esset, caput in cavum dolii inserebant, et recepto aëre rursus ad opus se conferebant. Nos quoque in balneo famulum fecimus caput suum in pelvim subter aquam cum aëre depressam inserere, qui ad dimidium quartæ partis horæ sub eodem mansit, donec aërem, ex anhelitu suo tepefactum, sensum quendam suffocationis induxisse sentiret.

Aër exiguam aliquam contractionem non ægre admittit. Id in vesica experiri res fallax est. Nam cum inflatur vesica, densatur ipso flatu aër, ut aër intra vesicam densior sit quam aër communis, ideoque non mirum est si ad novam condensationem sit ineptior. Sed in experimento illo vulgari de catino

ligneo subter aquam depresso, cerni datur aquam subintrantem ex extremo vasis nonnihil occupasse, atque aërem tantidem spatii detrimentum fecisse.

Sed ut de proportione magis liquido constet; globulum, vel aliud corpus solidum et ima petentem, in fundo vasis posuimus, super quod catinus imponendus esset; tum catinum (metallicum scilicet, non ligneum, quod in imo vasis stare ex sese posset) superimposuimus. Quod si corpus illud exiguæ sit magnitudinis, cum in concavum catini recipitur aërem contrudit, non extrudit. Quod si grandioris fuerit magnitudinis quam ut aër libenter cedat, tum aër, majoris pressuræ impatiens, catinum ex aliqua parte elevat, et in bullis adscendit.

Atque fieri fecimus globum cavum ex plumbo lateribus non admodum exilibus, ut vim mallei vel torcularis sustinere melius posset. Globus autem ille, malleis percussus ad utrumque polum, ad planisphærium magis et magis appropinquabat. Atque sub primis contusionibus facilius cedebat, postea pro modo condensationis, ægrius; ut ad extremum mallei non multum proficerent; sed pressorio, eoque forti, opus esset. Verum id præcepimus, ut a pressuris aliqui dies interponerentur, quod in præsentia nihil attinet, sed alio spectat.

Aër in vasa clausa exsuctione forti extenditur seu dilatatur, adeo ut parte aëris sublata, reliquus aër tamen eandem mensuram impleat quam totus impleverat; ita tamen ut magna contentione se restituere et ab illa tensura liberare nitatur. Id videre est in ovis, quæ aquam odoratam continent et per lusum jaciuntur et franguntur, ut adspersione et odore suavi aërem imbuant. Modus autem est, ut parvo admodum facto in extremo ovi foramine, ovi cibum universum exsugant, integra testa; tum vero fortiter aërem ipsum qui subintravit exsuctione forti alligant[1], et statim sub exsuctione digito foramen obturent, atque ovum hoc modo clausum subter aquam illam ponant, et tum demum digitum amoveant. Aër vero tensura illa tortus, et se recipere nitens, aquam trahit et introcipit, quousque portio illa aëris antiquam recuperet consistentiam.

Nos idem cum ovo vitreo experti sumus, et aquam receptam circa octavam partem contenti reperimus; tantum scilicet aër per exsuctionem erat extensus. Sed hoc pro violentia majore aut minore exsuctionis casum recipit. Sub finem vero exsuctionis labrum ipsum trahebat. Sed præterea cura nobis fuit

[1] So in the original.

novi experimenti, nimirum ut, postquam exsuctio facta fuisset, foramen cera bene obturaretur, et ovum ita obturatum per diem integrum maneret. Id eo fecimus, ut experiremur ut mora illa appetitum aëris minueret, ut fit in rebus consistentibus, viminibus, laminis ferreis, et similibus, quorum motus ad se recipiendum a tensura mora elanguescit; sed comperimus tantula illa mora nihil effectum, quin ovum illud æque fortiter ac similem traheret aquæ quantitatem, ac si continuo ab exsuctione immissum esset; adeo ut etiam foramine illius aperto extra aquam novum aërem cum sonitu et sibilo manifesto traheret: sed effectum ulterioris moræ experiri negleximus.

In follibus, si nullum detur spiraculum, et subito folles eleventur et aperiantur, franguntur; scilicet cum attrahi non possit per rostri follium angustias tanta aëris quantitas, quæ ventrem a plano in altum subito surgentem implere possit, nec aër qui adest in tantum extendi; unde sequitur follium effractio.

Historia.

Si aqua accipiatur in vitro ad mensuram justam, et locus usque quem aqua adscenderit signetur, et immittatur in aquam cinis communis per cribrum mundatus, et permittatur donec resederit; videbis spatium in fundo cinere occupatum adscendere quadruplo altius, quam corpus aquæ superficie adscenderit a loco prius signato; ita ut manifestum sit, aquam cum cinere commistam, aut sphæram mutare et se contrahere, aut cinerem intra cava aquæ recipere, cum nullo modo se expandat pro ratione cineris recepti. Verum si hoc in arena vel tenuissima (sed neutiquam calcinata aut combusta) experieris, videbis aquam surgere in superficie, pari spatio ac arena surrexerit in fundo. Existimamus etiam infusiones plerasque aquas onerare, neque tamen extendere pro mole corporis recepti; verum hujus rei experimentum omisimus.

Monitum.

Motum successionis, quem motum ne detur vacuum appellant, nullo modo cum motu receptionis a tensura confundimus. Sunt enim duo isti motus tempore et opere conjuncti, ratione diversi, ut in propria historia ejus motus patebit.

Aër per respirationem receptus exigua mora ita naturam vaporis induit, ut et speculum caligine quadam, et tanquam

roscida materia obducat, et frigore brumali circa barbam congeletur. Illa autem irroratio supra laminam ensis lucidam, aut adamantem, instar nubeculæ dissipatur, ut corpus politum se veluti expurget.

Modus processus aquæ circa expansionem et contractionem quæ fiunt in ejus corpore mediante igne, hujusmodi est. Aqua modico calore lacessita vaporem paucum et rarum emittit, antequam intra corpus ejus alia conspiciatur mutatio; deinde continuato et aucto calore, corpore tamen integro, non insurgit, nec etiam bullis minutioribus in modum spumæ effervescit, sed per bullas majores adscendens in vaporem copiosum se solvit, cito autem evolat aqua et absumitur. Atque vapor ille, si non impediatur, aëri se miscet; primum conspicuus, etiam postquam conspectum effugerit sensibilis, vel odorem fundendo vel etiam aërem ad tactum et anhelitum humectando et leniendo. Tandem vero intra pelagus illud aëris se condit et disperdit. Quod si prius occurrat corpus solidum (et eo magis si æquale fuerit et politum), vapor ille se ipse subingreditur, et in aquam restituitur excludendo sive excernendo aërem qui prius vapori immistus fuerat. Atque universus ille processus et in decoctione aquæ, ut in destillatione fit manifestus. Sed porro videmus vapores qui a terra emittuntur, si penitus a calore solis dissipati atque edomiti non fuerint, neque ab aëris frigore fortasse corpori ipsi aëris æqualiter commisti, licet corpori solido non occurrant, tamen a frigore et ipsa caloris destitutione in aquam restitui; ut in rore vespertino præsentius, in pluviis tardius fit. Ex æstimatione eaque diligenti statuimus, expansionem aëris, si ad aquam conferatur, ad rationem centuplam vicecuplam, aut circiter, accedere.

Historia Exporrectionis Materiæ in Pneumaticis.

PHIALAM vitream accepimus, quæ unciam fortasse unam capere posset; parvitatem autem vasis duas ob causas experimento convenire existimavimus; unam, quod minore cum calore ad bullitionem properaret, ne forte calore intensiore vesica quæ superimponenda esset adureretur atque exsiccaretur; alteram, ut minorem portionem aëris in ea parte quæ aqua implenda non esset caperet; cum ipsum aërem extensionem per ignem suscipere probe cognossemus. Itaque ut illa extensio rationes

aquæ minus disturbaret, non multum aëris adhiberi consultum putavimus. Phiala autem erat ejus figuræ, non quæ collum rectum haberet sine limbo sive labro (nam in hujusmodi phiala aquæ vapor citius destillaret, et in partem vesicæ collo phialæ conjunctam ros incumberet et delaberetur), sed quæ collum haberet paululum primo adductum, et deinde tanquam reversum cum labro. Hanc phialam ad dimidiam, non amplius (existimantes hoc etiam ad celeritatem bullitionis conferre), aquâ implevimus, atque pondus aquæ cum phiala ipsa exacte notavimus per arenam in bilance immissam; deinde vesicam accepimus quæ circiter pintam dimidiam contineret. Eam accepimus non veterem neque siccam, et per siccitatem magis renitentem, sed recentem et molliorem; vesicam autem primo in sufflando probavimus an integra esset, ne forte foramina haberet; postea ex eadem aërem omnem, quoad fieri potuit, expressimus. Etiam prius vesicam oleo extra oblivimus, et oleum quoque fricatione nonnulla recipi fecimus. Hoc eo pertinebat ut vesica clausior esset, ejus si qua erat porositate oleo obturata. Hanc vesicam circa os phialæ, ore phialæ intra os vesicæ recepto, fortiter ligavimus, filo parum cerato, ut melius adhæresceret et arctius ligaret. Sed hoc ipsum melius fit luto ex farina et albumine ovi facto, et cum papyro nigra ligato et bene siccato, ut experti sumus. Tum demum phialam supra carbones ardentes in foculo collocavimus. Aqua non ita multo post bullire incepit, ac paulatim vesicam ex omni parte sufflare, et fere ad rupturam usque extendere. Continuo vitrum ab igne removimus, et super tapetem posuimus, ne frigore vitrum disrumperetur; et statim in summitate vesicæ foramen acu fecimus, ne vapor cessante calore in aquam restitutus recideret, ac rationes confunderet. Postea vero vesicam ipsam cum filo sustulimus; lutum autem si adhibitum fuerat, expurgavimus; tum rursus aquam quæ remanserat cum phiala sua ponderavimus; comperimus autem circiter pondus duorum denariorum per vaporem absumptum fuisse. Quicquid autem corporis vesicam cum sufflata esset impleverat, ex illo quod de aqua perditum fuerat factum et productum fuisse cognovimus. Itaque materia cum in corpore aquæ contracta fuisset, tantum implebat spatii quantum pondus 2 denariorum corporis aquæ implebat; at eadem materia in corpore vaporis expansa dimidiam pintam implebat. Itaque secundum dimensionem in Tabula expressam rationes subduximus; vapor aquæ ad corpus aquæ

habere potest rationem octogecuplam. Vesica eo quo diximus modo sufflata, si nullum detur spiraculum, sed integra ab igne removeatur, statim ab inflatione illa decrescit, et subsidet, et contrahitur. Vapor dum vesica turget ex foramine emissus, aliam fere speciem a vapore communi aquæ habebat, magis raram et perspicuam, et erectam, nec cum aëre tam cito se miscentem.

Monita.

Ne quis putet, si major fuisset aquæ absumptio, tanto majorem vesicam impleri potuisse; nobis enim hoc expertis res non successit, sed inflatio quæ fit, fere confertim fit, nec gradatim. Id partim adustioni vesicæ tribuimus quæ facta est obstinatior nec cedebat facile, et erat forte porosior (hoc vero calore humido, ut balneo Mariæ, corrigi poterat); sed illud magis in causa esse putamus, quod vapor copiosior factus per successionem continuam, vergit ad restitutionem, et se ipse condensat. Itaque nec est æquiparandus vapor iste qui in vesicam recipitur, vaporibus qui intra clibana[1] recipiuntur; quia illi se mutuo subsequentes et trudentes densant, isti vero a vesicæ mollitie et cessione, præsertim sub initiis (ut diximus) antequam copia restitutionem incitet, se expandunt ut volunt.

Expansio vaporis aquæ omnino non est judicanda ex adspectu vaporis qui in aërem evolat; ille enim vapor statim cum aëre mistus longe maximam corporis misti dimensionem ab aëre mutuatur, nec sua stat mole. Itaque amplificatur ad molem quampiam aëris in quem recipitur, ad exemplum parvæ portionis vini rubei, aut alterius rei infectæ et coloratæ, quæ magnam quantitatem aquæ tingit. Rationes exactæ in tanta subtilitate, nec sine inutili et curiosa indagine haberi possunt, nec ad id quod agitur magnopere juvant. Satis est, ut pateat ex hoc experimento, rationem vaporis ad aquam non esse duplam, non decuplam, non quadragecuplam, non rursus millecuplam, non ducentuplam etc. Termini enim naturarum, non gradus, in præsentia investigantur. Itaque si quis suo experimento in rationem istam octogecuplam) vel propter figuræ vitri differentiam, vel propter vesicæ duritiem aut mollitiem, vel propter caloris modum) non incidat, id rem nullius esse momenti sciat. Nemo erit (existi-

[1] *Clibona* in the original. I believe it ought to be *clibanos*

mamus) tam imperitus, qui putet pneumatica et volatilia quæ ex corporibus ponderosis evolant, latere in poris eorundem corporum, nec esse illam ipsam materiam quæ ponderosa erat; sed a ponderosa parte separari, cum aqua quasi tota consumatur, et ad nihilum evaporet. Pruna ardens si in bilance ponatur, et usque ad extinctionem permittatur ut sit carbo, longe levior invenietur. Metalla ipsa per evolationes fumorum pondere insigniter mutantur. Itaque prorsus eadem materia numero tangibilis est et pondere dotatur, et fit pneumatica et pondus exuit.

Historia.

Modus processus olei talis est; si accipiatur oleum in phiala vitrea vulgari, et ponatur super ignem, tardius multo bullire incipit, et majorem calorem ad hoc ut bulliat desiderat, quam aqua. Ac primo guttulæ quædam aut granula per corpus olei sparsa apparent, adscendentia cum crepitatione quadam; interim nec bullæ in superficie ludunt, ut in aqua fit, nec corpus integrum mole insurgit, nec quicquam fere halitus evolat, sed paulo post corpus integrum inflatur et dilatatur proportione notabili, tanquam ad duplum insurgens. Tum demum copiosissimus et spissus evolat halitus: ad illum halitum si flamma admoveatur, etiam bono spatio supra os phialæ, flammam halitus continuo concipit, atque statim ad os phialæ descendit, atque ibi se figit, et perpetuo ardet. Quod si etiam majorem in modum calefactum fuerit oleum, ad extremum halitus ille extra vitrum flammans, absque flamma aut corpore aliquo ignito admoto, prorsus se ipse inflammat et expansionem flammæ induit.

Monitum.

Videndum est ut phiala sit oris angustioris, ut fumos constringat, ne aëri se statim ac largiter miscentes naturam inflammabilem deponant.

Historia.

Modus processus spiritus vini talis est. Ille minore multo calore excitatur[1] et celerius ad expansionem se comparat, eamque præstat, quam aqua. Ebullit autem magnis utique bullis,

[1] *excitatus* in the original.

absque spuma aut etiam totius corporis elevatione; vapor autem ejus dum confertus est, in bona ab ore vitri distantia flamma admota flammam concipit, non tam lucidam certe et bene compactam quam oleum, sed tenuem et jejunam, cœruleam quoque et fere perspicuam. Inflammatus autem fertur ad os vitri, ubi pabuli magis copiosi datur subministratio, quemadmodum et oleum. Verum tamen si inflammetur vapor in parte ab ore vitri nonnihil deflectente in obliquum, fit inflammatio in aëre pensilis, undulata, aut arcuata, imaginem vaporis secuta, et proculdubio longius ipsum comitatura, si vapor ille constipatus maneret, nec cum aëre se confunderet. Atque corpus ipsum spiritus vini, nullo præcedente vapore notabili, flamma admota et parum immorante, in flammam ejusque expansionem mutatur, eo citius et facilius, quo spiritus latius diffusus sit et minorem occupet altitudinem. Quod si spiritus vini in cavo palmæ manus ponatur, et candela accensa inter digitos juxta palmam collocetur (ut pueri cum pulvere resinæ ludere solent), et spiritus ille leviter projiciatur, et prorsum non sursum directo; ardet corpus ipsum in aëre, et accensum interdum descendit recta; interdum nubeculam in aëre volitantem explicat, quæ tamen ipsa ad descensum vergit; interdum ad tecti fastigium, vel latera, vel pavimentum, utique inflammatum, adhærescit et ardet, et sensim extinguitur.

Habent autem acetum, agresta, vinum, lac, atque alii liquores simplices (ex vegetabilibus et animantibus, dico, nam de mineralibus seorsim memorabimus) suos expansionum modos, atque in iis notabiles nonnullas differentias, quas hoc loco referre supervacuum visum est. Versantur autem istæ differentiæ in illis naturis, quas in processibus aquæ et olei et spiritus vini notavimus; gradu nempe caloris; et modo expansionis, quæ triplex est; vel toto corpore, vel spuma, vel bullis majoribus. Nam pinguia fere toto corpore; succi immaturi, ut agresta, bullis majoribus; succi effœti, ut acetum, minoribus, adscendunt. Etiam congregatio spiritus situ differt. Nam in vini bullitione bullæ circa medium, in aceto circa latera, se congregare in ebullitione primo incipiunt; quod etiam in vino maturo, et forti, et vapido rursus aut fugiente, cum infunduntur, fieri solet.

Omnes autem liquores, etiam oleum ipsum, antequam bullire incipiunt, paucas et raras semibullas circa latera vasis jaciunt. Atque illud etiam omnibus liquoribus commune est, ut parva quantitate citius bulliant et absumantur, quam magna.

Monitum.

Liquores manifeste compositos, ad historiam expansionis et coitionis materiæ mediante igne, haud idoneos aut proprios existimavimus, quia separationibus et misturis suis rationes simplicis expansionis et coitionis disturbant et confundunt. Itaque illos ad propriam historiam separationis et misturæ ablegavimus.

Historia.

SPIRITUS vini in experimento positus cum pileo illo tensibili (quem cum de aqua loqueremur descripsimus) hujusmodi sortitus est expansionem. Comperimus pondus 6 denariorum consumptum et in vaporem solutum, vesicam grandem quæ 8 pintas capere posset, explevisse et fortiter inflasse; quæ vesica decuplo-sextuplo erat major quam vesica illa qua ad aquam usi sumus, quæ dimidiam pintam tantum recipiebat. Sed in experimento aquæ ponderis solummodo 2 denariorum facta erat consumptio; quæ tertia tantum pars est denariorum sex. Ita supputatis rationibus, expansio vaporis spiritus vini ad expansionem vaporis aquæ quintuplam rationem habet, et amplius. Neque tamen obstabat immensa ista expansio, quin, vase ab igne remoto, corpus ad se restituendum properaret, vesica continuo flaccescente [1], et se insigniter contrahente. Atque ex hoc experimento corporis flammæ expansionem æstimare cœpimus, conjectura non admodum firma, et tamen probabili. Cum enim vapor spiritus vini res sit tam inflammabilis, atque ad naturam flammæ tam prope accedat, judicavimus rationes vaporis spiritus vini ad flammam, cum rationibus vaporis aquæ ad aërem convenire. Quales enim se ostendunt rationes rudimentorum, sive corporum imperfectorum et migrantium (vaporum scilicet), tales etiam evadere corporum perfectorum et statariorum (flammæ scilicet et aëris) consentaneum est. Ex quo sequetur, flammam aërem raritate sive expansione materiæ quintuplo et amplius superare. Tanto enim se invicem superant vapores sui, ut dictum est; flamma vero ipsa ad proprium vaporem, non impurum sed summe præparatum, sesquialteram rationem habere potest, ut aërem item ad vaporem aquæ summe præparatum habere posuimus.

Neque hæc multum discrepant ab iis quæ visu obiter per-

[1] *flavescente* in the original.

cipiuntur, et familiariter occurrunt. Nam si candelam ceream accensam flatu extinguas, et fili illius fumei qui adscendit (in ima parte antequam dispergatur) dimensionem animadvertas; et candelam prope flammam admoveas, et rursus portionem flammæ quæ primo allabitur contempleris; eam fumi magnitudinem non multo plus quam duplo excedere judicabis; et tamen ille fumus impurior est et pressior. Quod si pulveris tormentarii corporis dimensionem diligenter notes, aut ad meliorem conjecturam in situla metiaris, atque rursus, postquam flammam corripuerit, dimensionem flammæ suæ advertas; flammam corpus (quomodo hujusmodi res subito intuitu comprehendi possit) mille vicibus superare, non admodum negabis. Atque hujusmodi quædam proportio flammæ ad nitrum, ex iis quæ prius posuimus, debetur. Verum de his, cum ad observationes nostras super hanc historiam ventum erit, clarius explicabimus.

Aërem ipsum expandi et contrahi ex calore et frigore, in ventosis quibus utuntur medici ad attractionem luculenter videmus. Illæ enim super flamma calefactæ et continuo ad carnem applicatæ, carnem trahunt, contrahente se et restituente paulatim aëre. Atque hoc operatur ex sese, licet stuppa immissa atque inflammata non fuerit, qua ad vehementiorem attractionem uti solent. Quinetiam si spongia frigida infusa ventosis superimponatur exterius, tanto magis se contrahit aër virtute frigoris, et fortior fit attractio.

Salinum argenteum, quale forma companili vulgatissima ad mensæ usum adhibemus, in lavacro aut patera aqua plena collocavimus, aërem depressum secum una ad vasis fundum vehens. Tum prunas ardentes duas aut tres in concavo illo parvo quod salem excipere solet posuimus, atque ignem a flatu excitavimus. Evenit autem non multo post, ut aër per calorem rarefactus, et antiquæ sphæræ impatiens, salini fundum ex aliquo latere elevaret, et in bullis adscenderet.

Hero describit altaris fabricam, eo artificio, ut superimposito holocausto et incenso, subito aqua decideret, quæ ignem extingueret. Id non aliam poscebat industriam, quam ut sub altare loco cavo et clauso aër reciperetur, qui nullum alium (cum ab igne extenderetur) inveniret exitum, nisi qua aquam in canali ad hoc paratam impelleret et extruderet. Erant etiam Batavi quidam nuper apud nos, qui organum quoddam musicum confecerant, quod radiis solis percussum symphoniam quandam

edebat. Id ab aëris tepefacti extensione, quæ principium motus dare potuit, factum fuisse verisimile est; cum certum sit aërem, vel exigui admodum caloris contactu lacessitum, expansionem statim moliri.

Verum ad magis accuratam expansionis aëris notitiam, ad vesicam illam sensibilem versi, vitrum accepimus vacuum (scilicet aëre solo impletum); ei pileum illum ex vesica (de quo jam antea locuti sumus) imposuimus. Vitro autem super ignem imposito, celerius et minore calore se extendebat aër, quam aqua aut spiritus vini; sed expansione non admodum ampla. Hanc enim proportionem ferebat: si vesica ex semisse minoris contenti erat quam vitrum ipsum, aër illam fortiter sane et plene inflabat; ad majorem expansionem non facile adscendebat; foramine autem in summitate vesicæ, dum inflaretur, facto, nullum exibat corpus visibile.

DESCRIPTIO

GLOBI INTELLECTUALIS

ET

THEMA CŒLI.

PREFACE

TO THE

DESCRIPTIO GLOBI INTELLECTUALIS.

THIS tract, published by Gruter in 1653, must have been written about 1612. This follows from what is said of the new star in Cygnus[1], which was first observed in 1600. It is therefore intermediate in date between the *Advancement of Learning* and the *De Augmentis;* and though on a larger scale than either, it is to be referred to the same division of Bacon's writings. The design of all three is the same, namely, a survey of the existing state of knowledge. The commendation of learning which forms the first book of the other two works being in this one omitted, it commences with the tripartite division of knowledge which Bacon founded on the corresponding division of the faculties of man—memory, imagination, and reason. History, which corresponds to memory, is here as in the *De Augmentis* primarily divided into natural and civil, whereas in the *Advancement* the primary division of history is quadripartite, literary and ecclesiastical history being made co-ordinate with civil history, instead of being as here subordinated to it.

The divisions of natural history are then stated, and are the same as in the *De Augmentis;* and the remainder of the tract relates to one of these divisions, namely the history of things

[1] Stella nova in pectore Cygni . . jam per duodecim annos integros duravit.

celestial, or in other words to astronomy. The problems which it should consider, and the manner in which they ought to be solved, are treated of at some length; but even with respect to astronomy much which it is proposed to do is left undone, the whole tract being merely a fragment.

Bacon has nowhere else spoken so largely of astronomy; the reason of which apparently is, that he was writing just after Galileo's discoveries had been made known in the *Sydereus Nuncius*, published in 1611; a circumstance which makes the *Descriptio Globi Intellectualis* one of the most interesting of his minor writings. The oracles of his mind were in this case evoked by the contemplation, not of old errors, but of new truths.

The *Thema Cœli*, which contains a provisional statement of his own astronomical opinions, is immediately connected with the astronomical part of the *Descriptio Globi Intellectualis*. They are clearly of the same date, and form in reality but one work.

In the *De Augmentis* Bacon has expressed the same general views on the subject of astronomy as in these tracts; and they are in truth views which it was natural for a man not well versed in the phenomena of the science to entertain and to promulgate. What had been done by the old astronomers seemed to him full of useless subtleties and merely mathematical conceptions; men therefore were to be exhorted to cast all these aside, and to study the phenomena of the heavens independently of arbitrary hypotheses. Let us first obtain an accurate knowledge of the phenomena, and then begin to search out their real causes. Orbs, eccentrics, and epicycles must not stand between the astronomer and the facts with which he has to deal. In this language, which had been held by others, there is something not wholly untrue; yet the counsel which it contains would, if it could have been followed, have put an end to the progress of astronomical science. Let us obtain an accurate knowledge of the phenomena — this no doubt is necessary, but then how is it to be done? To say that instead of trying to resolve the motion of the planets into a combination of elementary circular motions, we ought to be content to save the appearances by means of spirals, is to no purpose unless we are prepared to give an accurate definition of the kind of spiral we mean. Failing this, a statement that the

apparent path of a planet is a spiral or irregular line along which it moves with varying velocity, is much too vague to be of any scientific value whatever; and if we seek to give precision to this statement, we find ourselves led back again into the region of mathematical conceptions, or, if the phrase be preferred, of mathematical hypotheses. The distinction between what is real and what is only apparent lies at the root of all astronomy; and it is in vain to seek for a physical cause of that which has only a phenomenal existence, as for instance of the stations and regressions of the planets. Thus in two points of view, astronomy must of necessity employ mathematical hypotheses, firstly in order to the distinct conception of the phenomena, and secondly in order to be able to state the problems which a higher science is afterwards to solve. If the hypotheses employed are inappropriate, as in the systems of Ptolemy or Tycho Brahe, they may nevertheless have done good service in making it possible to conceive the phenomena, and moreover may serve to suggest the truer views by which they are to be replaced. Almost any hypothesis is better than none, "citius enim," as Bacon has elsewhere said, "emergit veritas ex errore quam ex confusione." The wrong hypotheses doubtless lead to premature speculation touching physical causes; but this is a mischief which in course of time tends to correct itself, as we see in the Ptolemaic system, of which the overthrow was in good measure due to the cumbrous machinery of solid orbs which had been constructed to explain the motions mechanically. It came to be seen that even if this system could save the phenomena, it was unable to give a basis on which a just explanation of their causes could be founded.

I have said that almost any hypothesis is better than none. But the truth is that as soon as men begin to speculate at all an hypothesis of some kind or other is a matter of necessity. On merely historical grounds and apart from any consideration of the relation between facts and ideas, questions might be propounded to a writer who was trying to describe the phenomena of the heavens without introducing any portion of theory, to which he would not find it easy to give clear answers. Thus we know that one of the philosophers of antiquity affirmed that the sun is new every day;—are you prepared, we might ask, to set aside the authority of Heraclitus, and to maintain your theory in opposition to his? If you affirm that the sun which

set last night is the same as that which rose this morning, you are no longer a describer of phenomena, but, like those whom you condemn, a dealer in hypotheses.

However this difficulty is got over, you will at any rate not venture to confound Hesperus and the morning star. It is true that one of the great teachers of Greece long since asserted that they are the same; but the speculative fancies of Pythagoras must be rejected not less than those of Ptolemy or Regiomontanus.

We find that Bacon, both in the *De Augmentis* and in the following tract, speaks of the constructions of astronomy as purely hypothetical. In this he agrees with many other writers. It was a common opinion that these constructions had no foundation in reality, but were merely employed as the basis of mathematical calculations. They served to represent the phenomena, and that was all. This view, which has not been without influence on the history of astronomy, inasmuch as it made the transition from one hypothesis to another more easy than it would have been if either had been stated as of absolute truth, connected itself with a circumstance not unfrequently overlooked. The struggle between the peripatetic philosophers and the followers of Copernicus has caused an earlier struggle of the same kind to be forgotten. The Ptolemaic system is in reality not much more in accordance with the philosophy of Aristotle than the Copernican; and therefore, while the authority of Aristotle was unshaken, it could only be accepted, if accepted at all, as a means of representing the phenomena. The motions of the several orbs of heaven must, if our astronomy is to accord with Aristotle, be absolutely simple and concentric. On these conditions only can the incorruptibility of the heavens be secured. Consequently eccentrics and epicycles must be altogether rejected; and as the Ptolemaic system necessarily employs them, it follows that this system is only of value as a convenient way of expressing the result of observation. Such was the view of those who, while they adopted Aristotle's principles, were aware that the astronomical system with which he was satisfied, and of which he has given an account in the twelfth book of the *Metaphysics*, was wholly inadequate as a representation of the phenomena. But his more strenuous adherents went further, and followed Averroes in speaking with much contempt of Ptolemy and of his

system; an excess of zeal which Melancthon, in the spirit of conciliation which belongs to his gentle nature, has quietly condemned.[1]

Out of this antinomy, if the word may be so used, sprang several attempts to replace the Ptolemaic system by a construction which should be in accordance both with the phenomena and with Aristotle. Of these the best known is the Homocentrica of Fracastorius. As the name implies, all the orbs have on this hypothesis the same centre, and of these homocentric orbs he employs seventy-seven. But a fatal objection to this and all similar attempts is that they can give no explanation of changes in apparent distance. Fracastorius tries to set aside this objection by asserting that although the distance of some of the heavenly bodies from the earth may seem to vary, yet it never does so in reality, the apparent variation being caused by the varying medium through which they are seen.

Though this explanation is wholly unsatisfactory, the wish to get rid of eccentrics and epicycles was sufficiently strong to win for Fracastorius a much more favourable reception than his complex and imperfect hypothesis deserved. He was spoken of as a man who had succeeded in overcoming the divorce which had so long separated astronomy from philosophy.[2]

Of the similar attempt made by D'Amico I know no more than what is mentioned by Spiriti in his *Scrittori Cozentini.*

The Ptolemaic system being thus treated as a mere hypothesis by the followers of Aristotle, for of course the astronomers who accepted Purbach's theory of solid orbs must have regarded it as a reality, it was natural that Bacon should have thought that what we now call physical astronomy, that is the causal explanation of the phenomena, ought to be studied independently of this system. Whatever it had accomplished might be as well done without it. Spirals and dragons would be found sufficient to represent the phenomena, if the perverse love of simplicity which had led the mathematicians to confine themselves to circles and combinations of circles was once got rid of. Galileo's view of this matter is however un-

[1] See Initia Physicæ.

[2] See Flaminius. [Carmin. lib. ii. f. 30. *Ed. Lutet. per Nicol. Divitem.*] It is remarkable that Delambre declares that he cannot see why Fracastorius should have thought his own system better than the old one. The reason is perfectly obvious if we consider the matter in connection with the history of philosophy.

doubtedly the true one, "Le linee irregolari son quelle che, non avendo determinazion veruna sono infinite e casuali, e perciò indefinibili, nè di esse si può in conseguenza dimostrar proprietà alcuna, nè in somma saperne nulla; sicchè il voler dire, il tale accidente accade mercè di una linea irregolare, è il medesimo che dire io non so perchè ei si accagia."[1]

Bacon was not the first who proposed to sweep away from astronomy the mathematical constructions by which it seemed to be encumbered. We find in Lucretius nearly the same views as those of Bacon. The astronomers, Bacon often says, insist on explaining the retardation of the inferior orbs by giving them a proper motion of their own, opposite to that which they derive from the starry heaven: surely it would be simpler to say that all the orbs move in the same direction with unequal velocities; the inequality depending on their remoteness from the prime mover.

Compare with this the following lines of Lucretius:—

> "Quanto quæque magis sint terram sidera propter,
> Tanto posse minus cum cœli turbine ferri:
> Evanescere enim rapidas illius, et acreis
> Imminui subter, vireis; ideoque relinqui
> Paullatim solem cum posterioribu' signis,
> Inferior multum quum sit quam fervida signa:
> Et magis hoc lunam;" &c.[2]

But it was probably not from Lucretius that Bacon derived this way of considering the matter. For Telesius, whom Bacon esteemed "the best of the novelists," and whose pastoral philosophy, as he has not unhappily called it, was contented with vague speculations as to the causes of phenomena without any accurate knowledge of their details, had suggested to his followers that it was nowise necessary to resolve the motion of the sun into the motion of the starry heaven and the motion of his own orb, and that on the contrary this composition of motions is unintelligible. You may see, he affirms, with your own eyes the way in which the sun, moving with one motion only, advances continually from east to west, and alternately towards the north and south; all that is necessary is to admit that the poles on which he revolves are not constantly at the same dis-

[1] Saggiatore, il. p. 187.

[2] Lucret. v. 622.

tance from the poles of heaven, but on the contrary arc always receding from or advancing towards them.[1]

Amongst those who called themselves Telesians the view here suggested received a fuller development; they adopted the doctrine of Alpetragius, a Latin translation of whose *Theorica Planetarum* was published at Venice in 1531. Alpetragius professes that he found the complication of the Ptolemaic system intolerable, and that the foundation of his own is much simpler. "Apparet sensu quod quilibet planeta revolvitur singulo die super circulis æquidistantibus ab æquinoctiali; attamen diuturnitate temporis et revolutione planetæ multis revolutionibus ex periodis diurnis, videtur ille planeta moveri a puncto in quo visus est primum æquinoctialis et respectu motus similis ei postponi in longitudine et declinare a suo primo loco in latitudine," of which the reason is that it does not really revolve in circles parallel to the equator, "sed est revolutio girativa dicta laulabina ex declinatione planetæ a loco suo in latitudine."[2] Of this the reason is twofold: the planet's orb moves more slowly than the prime mover in consequence of its essential inferiority, an inferiority which increases in the case of different planets with their nearness to the earth; and its poles revolve on two small circles parallel to the equator. Alpetragius goes on to apply these hypotheses to each of the planets. It is needless to point out of how little value his speculations necessarily are. Such as they are however, the Telesians, as we learn from Tassoni[3], were content to accept them. Of the astronomical writings of the Telesians I have not been able to find any account. None of those who are mentioned by Spiriti appear to have published anything on the subject. However this may be, the authority of Tassoni is sufficient to show that the school of Telesius rejected the Ptolemaic system and especially the notion that the planets &c. have a proper motion from west to east; and that their views are therefore in accordance with those which Bacon propounds in the *Thema Cœli*, so far at least as relates to the general conception of the planetary motions.

Patricius, on whom the influence of Telesius is manifest, and who furnished Bacon with many of the facts contained in the

[1] Telesius, De Rer. Nat. iv. 25.
[2] Alpetragius, fo. 14. v.
[3] Pensieri diversi, ii. 4. (Venice, 1636.)

following treatises, also rejected, and more contemptuously than Telesius, the common astronomical hypotheses. The planetary motions, their stations and regressions are, he says, explained by astronomers by the help of epicycles and eccentrics; but we ascribe them to the natures and spirits of the planets, and in a higher degree to their souls and minds. Of this idle talk Gilbert remarks that it destroys the study of astronomy. "Quid autem," he observes, "tum postea spectabit otiosus incassum philosophus, opinione suâ satiatus, cœlum sine usu sine motuum prævidentiâ: ita nullius usus erit illa scientia."[1] But Patricius's opinions on astronomy could clearly not be of much value, seeing that he was sufficiently ignorant to blame astronomers for not taking into account the distance of the place where their observations are made, from the centre of the earth; and speaks of this omission as "a most evident fallacy:" a remark which proves that he had either never heard of the correction for parallax, or having heard of it was unable to understand its nature.

From him, however, Bacon derived some of the most remarkable statements in the *Descriptio Globi Intellectualis*; particularly the incredible account of the mutations which Venus underwent in 1578. That, setting aside Patricius's loose way of speaking, the real phenomenon was simply that Venus was visible before sunset, is probably the safest explanation of the whole story; of which I have found no mention elsewhere. Thus much however is certain, that there could have been no such peculiarity in her appearance as to suggest to well-informed persons the notion that she had undergone any real change, since in the controversy whether there were any evidence of corruption or generation in the heavens a fact like this could not have been passed over.

Of the discoveries announced by Galileo in the *Sydereus Nuncius* Bacon does not speak at much length, though it is difficult not to believe that he was led to say so much of astronomical theories by the interest which these discoveries must have excited when they were first made known. The discovery of Jupiter's satellites, the resolution into stars of the nebula Præsepe, and the irregularities in the moon's surface,

[1] Physiol. Nov. ii. 9.

are all mentioned in the following tract; but, as I have said, somewhat briefly.[1]

It is remarkable that neither in the following tracts nor in his subsequent writings has Bacon mentioned the discoveries of Kepler. The treatise *De Stellâ Martis* was published in 1609, and became known in England at least as early as 1610. Harriot, it appears from Professor Rigaud's account of his papers, was then in correspondence with him, and repeated his calculations. That Bacon was acquainted with his writings we can hardly believe; they bear so directly on the questions which he has discussed that he could scarcely have neglected to notice them, had he known them even by report. In the very first page of Kepler's great work we find a quotation from Peter Ramus, declaring that he would resign his professorship in favour of any one who should produce an astronomy without hypotheses. To this Kepler subjoins an apostrophe to Ramus, telling him that it is well that death had relieved him of the necessity of redeeming his pledge, and vindicating Copernicus from the charge of having explained the phenomena of astronomy by unreal hypotheses. The same subject is resumed in the preface, and elsewhere throughout the book. Again, in another point of view, it makes Bacon's complaints that astronomers cling superstitiously to perfect circles appear somewhat out of date, to find that before the time at which he wrote the man who confessedly both by his genius and his official position stood at the head of the astronomers of Europe and, so to speak, represented them, had succeeded in saving the phenomena more accurately than had been done before, by means of ellipses. A great change had just taken place; two most remarkable laws, the foundations of modern physical astronomy, had just been propounded, namely the law of elliptic motion, and that of the equable description of areas; and the whole state of the question with respect to the truth or false-

[1] The interest which these discoveries excited must have been very great. Sir William Lower writes to Harriot, "I gave your letter a double welcome, both because it came from you and contained news of that strange nature . . . Methinks my diligent Galileus hath done more in his threefold discovery than Magellane in opening the straits to the South Sea, or the Dutchmen that were eaten by bears in Nova Zembla." The news had just reached him. His date is "the longest day of 1610." It had taken rather more than than three months to travel from Italy to Wales.—*Professor Rigaud's Supplement*, &c., p. 26.

hood of the Copernican system was thus changed. In truth this system was inextricably connected not only with Kepler's results, but with his method. In his dedication to the Emperor he says, "Locum (that is, the place of Mars) indagine cinxi, curribus magnæ Matris Telluris in gyrum circumactis." He means by this that he used observations of Mars made when in the same point of his orbit, the earth being at the time of the different observations in different points of hers. The same idea of the connexion of the Copernican hypothesis with Kepler's method, is expressed in one of the complimentary stanzas prefixed to the book: —

> Cœlos Keplerus terrarum oppugnat alumnus:
> De scalis noli quærere: terra volat.

In one of Kepler's letters to David Fabricius, nothing can be more decided than his rejection of the notion that all motions of the heavenly bodies are in perfect circles. "Quod ais non dubium quin omnes motus fiant per circulum perfectum, si de compositis (id est de realibus) loqueris, falsum: fiunt enim Copernico, ut dixi, per orbitam ad latera circuli excedentem, Ptolemæo et Braheo insuper per spiras. Sin autem loqueris de componentibus, de fictis igitur hoc est de nullis loqueris. Nihil enim in cœlo circumit præter ipsum corpus planetæ, nullus orbis, nullus epicyclus: quod Braheanæ Astronomiæ initiatus ignorare non potes." And it is interesting to observe how clearly he distinguishes between the real motions and the component elements into which they may be resolved.

Until the language of modern analysis had enabled us to express the nature and properties of curves merely quantitively, without reference to genesis or construction, it was difficult to attain to a clear way of thinking as to the relation which astronomical hypotheses bear to reality. In order to define the motion which actually takes place, it was necessary to refer to simpler motions which have only an abstract or ideal existence. But then it was asked, how can the result be real if the elements are not so? In this point of view the unpicturesqueness of symbolical language, though it has led to other inconveniences, has delivered us from a great deal of confused thinking. If Poinsot's illustration of the motion of a rigid body by means of a central ellipsoid rolling on a fixed plane, had been proposed at the beginning of the seventeenth century,

most people would have said that the hypothesis was absurd, though it might correspond to the phenomena.

To take the matter more generally, it must be remembered that positive truth or falsehood belongs only to the region of the actual and individuated. To say that two and three make five is not to deny that four and one do so too, although if I assert that of five houses, first three were built and then two added, I contradict the assertion that four were built at first and that only one is of later date. Not merely in the relation between cinématical or formal and physical astronomy, but generally, the question whether an hypothesis be true or false does not arise unless it is presented as a causal explanation. Thus when Berosus taught that one half of the moon is luminous, and that her phases arise from this half being always turned towards the sun in virtue of their mutual sympathy, both being bright, the explanation is unexceptionable, except so far as relates to the efficient cause. One half of the moon always is bright; and always is turned to the sun; and this Berosus saw as clearly as we do. It is in this way that false hypotheses are transformed into true ones; not by the transformation of anything false into truth, but by the severance of the causal or real element from that which is neither true nor false, namely the abstract conception. But the interest of the subject has led me to dwell on it at too much length.

It is curious to observe that in the interval between the composition of the following tracts and that of the *De Augmentis* Bacon's leaning against the Copernican system became more decided, though in the same interval the system had received an accession of strength, of which doubtless he was not aware, in the discovery of Kepler's third law.[1] This law, connecting as it does the planets with the sun by an uniform

[1] This discovery was made, as Kepler has informed us, on the 15th of May, 1618. In Professor Rigaud's account of Harriot's papers, published in 1833, it is mentioned that Harriot, who was apparently the first person to determine the periods of Jupiter's satellites, committed an error of calculation, in consequence of which that of the first satellite is given at about half its real length, but that Harriot, even before the publication in 1614 of Marius's *Mundus Jovialis*, seems to have suspected his error. The Professor enquires why he did not try his result by means of Kepler's third law, as we know that he was a student of the work in which this law is stated; forgetting that only the first two laws were given in the *De Stellâ Martis*, and that in the interval referred to, between 1610 and 1614, Harriot could no more have known of Kepler's third law than of Newton's *Principia*. But it is really curious that Kepler does not seem to have applied his law to the satellites. The application is said to have been first made by Vendelinus. See Narrien, *Hist. of Astronomy*, p. 398.

relation which is fulfilled also by the earth, is in some respects the most remarkable of the three, and points the most directly to the sun as the great centre of our system. No doubt neither this law, nor all three together, amounts to a positive demonstration: it has sometimes been forgotten that after all they are but approximations to the truth; but of all approximations these laws are the most remarkable, and it would be very difficult to doubt, even without the knowledge we now possess, that they are grounded on a physical basis. This basis is their correspondence with a causal or physical approximation. They would be absolutely true if the lesser bodies of the solar system did not attract one another, and if all were attracted by the sun as if he and they were physical points. It would be possible to crowd together a number of epicycles whereby the orbit of the earth would be better represented than on the elliptic hypothesis; but such a system would have no physical significance. No doubt too, all the laws might be true and yet the earth at rest; but we could not adopt such an opinion without doing violence to all our ideas of symmetry and harmony,—ideas which influence our judgments of natural things more than we are aware of. Such a doctrine would be felt "primam violare fidem." We may well believe that had Bacon been acquainted with the discoveries of Kepler, he would not only have been impressed by their astronomical importance, but have felt the full force of the lesson which they convey. He would have felt that they constituted a sufficient reason for transferring the allegiance which had been paid to Mother Earth to a nobler object more justly entitled to the homage which she had so long received. We now know that neither Earth nor Sun is the true Hestia of the old Philosopheme. We know too, that in all the orbs of heaven that we can see or dream of, there can be nothing fully entitled to the appellation, — nothing wholly fixed, or wholly unperturbed. Happy for us if we feel also that there is a Sun of suns whose absolute existence transcends our conceptions of space and time.[1]

[1] Deus, sine qualitate bonus, sine quantitate magnus, sine indigentia creator, sine situ præsens, sine habitu omnia continens, sine loco ubique totus, sine tempore sempiternus, sine ulla mutatione mutabilia faciens, nihilque patiens. — *St. Augustine, De Trin.*

DESCRIPTIO
GLOBI INTELLECTUALIS.

CAPUT I.

Partitio universalis Humanæ Doctrinæ in Historiam, Poësin, Philosophiam, *secundum triplicem facultatem mentis,* Memoriam, Phantasiam, Rationem; *quodque eadem partitio competat etiam in Theologicis: cum idem sit vas* (*nempe intellectus humanus*) *licet materia et insinuatio sint diversa.*

Partitionem Doctrinæ Humanæ eam deligimus, quæ triplici facultati intellectus respondeat. Tres itaque ejus partes a nobis constituuntur: Historia, Poësis, Philosophia. Historia ad Memoriam refertur: Poësis ad Phantasiam: Philosophia ad Rationem. Per Poësin autem nihil aliud intelligimus hoc loco, quam historiam fictam. Historia proprie individuorum est; quorum impressiones sunt mentis humanæ primi et antiquissimi hospites; suntque instar primæ materiæ scientiarum. In his individuis, atque in hac materia, mens humana assiduo se exercet, interdum ludit. Nam scientia omnis, mentis et exercitatio et opificium; poësis ejusdem lusus censeri possit. In philosophia mens mancipatur rebus; in poësi solvitur a nexu rerum, et expatiatur, et fingit quæ vult. Hæc vero se ita habere facile quis cernat, qui simpliciter tantummodo et pingui quadam contemplatione intellectualium origines petat. Etenim individuorum imagines excipiuntur a sensu, et in memoria figuntur. Abeunt autem in memoriam tanquam integræ, eodem quo occurrunt modo. Has rursus retrahit et recolit mens; atque (quod officium ejus proprium est) portiones earum componit et dividit. Habent enim individua singula aliquid inter se commune, atque aliud rursus diversum et multiplex. Ea vero compositio atque divisio vel pro arbitrio mentis fit, vel proac invenitur in rebus. Quod si fiat pro arbitrio mentis,

atque transferuntur portiones illæ ad placitum in similitudinem quandam individui, phantasiæ opus est, quæ nulla naturæ aut materiæ lege et necessitate astricta, ea quæ in rerum natura minime conveniunt conjungere, quæ vero nunquam separantur discerpere potest; ita tamen ut intra primas illas ipsas individuorum portiones coërceatur. Nam eorum quæ nulla ex parte se sensui obtulerunt, non est phantasia, ne somnium profecto. Quod si eædem individuorum portiones componantur et dividantur pro ipsa rerum evidentia et prout vere in natura se produnt aut saltem pro captu cujusque se prodere notantur, eæ partes rationis sunt: atque universa hujusmodi dispensatio rationi attribuitur. Ex quo liquido constat, ex tribus hisce fontibus esse tres illas emanationes Historiæ, Poësis, et Philosophiæ; neque alias aut plures esse posse. Nam sub philosophiæ nomine complectimur omnes artes et scientias, et quicquid denique a singularum rerum occursu per mentem in generales notiones collectum et digestum est. Neque alia censemus ad Doctrinam[1] partitione, quam illa superiore, opus esse. Informationes enim oraculi et sensus, et re proculdubio et modo insinuandi differunt; sed tamen spiritus humanus unus atque idem est: perinde ac si diversi liquores, atque per divisa infundibula, tamen in unum atque idem vas recipiantur. Quare et Theologiam ipsam aut ex historia sacra constare asserimus, aut ex præceptis et dogmatibus divinis, tanquam perenni quadam philosophia. Ea vero pars quæ extra hanc divisionem cadere videtur (quæ est prophetia) et ipsa historiæ species est, cum prærogativa divinitatis in qua tempora conjunguntur, ut narratio factum præcedere possit; modus[2] autem enuntiandi et vaticiniorum per visiones et dogmatum cœlestium per parabolas participat ex poësi.

CAPUT II.

Partitio Historiæ in Naturalem et Civilem; Ecclesiastica et Literaria sub Civili comprehensa. Partitio Historiæ Naturalis in Historiam Generationum, Præter-generationum, et Artium, ex triplici statu naturæ, liberæ *videlicet,* aberrantis, *et* constrictæ.

Historia aut Naturalis est, aut Civilis. In Naturali naturæ res gestæ et facinora memorantur; in Civili, hominum. Elu-

[1] So in the original. It should be *Theologica*. See the heading of the chapter, and compare *De Aug.* ii. 1. — *J. S.*

[2] *modum* in the original.—*J. S.*

cent proculdubio divina in utrisque, sed magis in humanis, ut etiam propriam in historia speciem constituant, quam Sacram aut Ecclesiasticam appellare consuevimus. Itaque eam Civili attribuimus; at primo de Naturali dicemus. Naturalis Historia rerum singularium non est; non quod perperam a nobis positum sit historiam versari in individuis, quæ loco et tempore circumscribuntur. Nam proprie ita se res habet. Sed cum promiscua sit rerum naturalium similitudo, adeo ut si unum noris omnia noris, superfluum quiddam esset et infinitum de singulis dicere. Itaque sicubi absit illa promiscua similitudo, recipit etiam historia naturalis individua; ea scilicet quorum non est numerus, aut natio quædam. Nam et solis, et lunæ, et terræ, et similium, quæ unicæ sunt in specie sua, rectissime conscribitur historia; nec minus eorum quæ insigniter a specie sua deflectunt, et monstrosa sunt; quandoquidem in illis, descriptio et cognitio ipsius speciei nec sufficit nec competit. Itaque hæc duo individuorum genera historia naturalis non rejicit: ut plurimum autem (quemadmodum dictum est) in speciebus versatur. At partitionem historiæ naturalis moliemur ex vi et conditione ipsius naturæ, quæ in triplici statu posita invenitur, et tanquam regimen subit trinum. Aut enim libera est natura ac sponte fusa atque cursu consueto se explicans, cum scilicet ipsa natura per se nititur, nullatenus impedita aut subacta, ut in cœlis, animalibus, plantis, et universo naturæ apparatu; aut rursus illa a pravitatibus et insolentiis materiæ contumacis et rebellis atque ab impedimentorum violentia de statu suo plane convellitur et detruditur, ut in monstris et heteroclitis naturæ; aut denique ab arte et ministerio humano constringitur et fingitur et plane transfertur et tanquam novatur, ut in artificialibus. Etenim in artificialibus natura tanquam facta videtur, et conspicitur prorsus nova corporum facies et veluti rerum universitas altera. Itaque tractat historia naturalis aut *libertatem* naturæ, aut *errores*, aut *vincula*. Quod si cuiquam molestum sit Artes dici Naturæ Vincula, cum potius liberatores et vindices censeri debeant, quod naturam in nonnullis suæ intentionis compotem faciant, impedimentis in ordinem redactis; nos vero hujusmodi delicias et pulchra dictu nil moramur; id tantum volumus et intelligimus, naturam per artem, tanquam Proteum, in necessitate poni id agendi quod absque arte actum non fuisset: sive illud vis vocetur et vincula, sive auxilium et perfectio. Partiemur itaque Historiam Naturalem in Histo-

riam Generationum; Historiam Prætergenerationum; et Historiam Artium, quam etiam Mechanicam et Experimentalem appellare consuevimus. Libenter autem Historiam Artium ut historiæ naturalis speciem constituimus; quia inveteravit prorsus mos disserendi et opinio, ac si aliud quippiam esset ars a natura, ut artificialia a naturalibus segregari debeant, tanquam toto genere discrepantia: unde et illud mali, quod plerique historiæ naturalis scriptores perfunctos se putant, si historiam animalium aut plantarum aut mineralium confecerint, omissis artium mechanicarum experimentis (quæ longe maximi ad philosophiam momenti sunt); tum etiam illabitur animis hominum subtilius aliud malum; nempe ut ars censeatur solummodo ut additamentum quoddam naturæ; cujus scilicet ea sit vis, ut naturam vel inchoatam perficere vel inclinatam emendare possit, minime vero radicitus transmutare atque in imis concutere; quod plurimum rebus humanis desperationis intulit. At contra illud penitus animis hominum insidere debuerat, artificialia a naturalibus non forma aut essentia, sed efficiente tantum, differre; homini vere in naturam plane nullius rei potestatem esse, præterquam motus: ut corpora scilicet naturalia aut admoveat, aut amoveat; reliqua naturam intus per se transigere. Itaque ubi datur debita admotio corporum naturalium aut remotio, omnia potest homo atque ars; ubi non datur, nihil. Rursus autem, modo corporum fiat debita illa admotio aut remotio in ordine ad aliquem effectum, sive hoc per hominem et artem fiat sive naturaliter absque homine, parum refert; neque hoc illo fortius est: veluti si quis ex aspersione aquæ simulachrum iridis super parietem excitet, non minus obsequente utitur natura, quam cum idem fit in aëre ex nube roscida: contra vero, cum aurum invenitur in arenulis[1] purum, æque sibi ipsi ministrat natura, ac si aurum purum per fornacem et ministerium hominis excoqueretur. Aliquando autem ministerium ex lege universi aliis animalibus deputatur: neque enim minus artificiale quiddam est mel, quod fit mediante industria apis, quam saccharum, quod hominis: atque in manna (quod similis est generis) natura seipsa contenta est. Itaque cum una atque eadem sit natura, ejus autem vis per omnia valeat, neque unquam illa a seipsa desciscat, omnino tanquam ex æquo subordinata tantum ad naturam poni debent hæc tria, Cursus

[1] *renulis* in the original.—*J. S.*

naturæ; Exspatiatio naturæ; et Ars sive additus rebus Homo; ideoque in historia naturali ea omnia una et continua narrationum serie involvi par est: quod etiam Caius Plinius magna ex parte fecit; qui historiam naturalem pro dignitate complexus est, sed complexam indignissime tractavit. Atque hæc sit Naturalis Historiæ partitio prima.

CAPUT III.

Partitio Historiæ Naturalis, ex usu et fine suo; quodque finis longe nobilissimus Historiæ Naturalis sit ministratio prima ad condendam Philosophiam; et quod hujusmodi historia (quæ scilicet sit in ordine ad eum finem) desideretur.

Cæterum Historia Naturalis ut subjecto triplex (quemadmodum diximus), ita usu duplex est. Adhibetur enim aut propter cognitionem rerum ipsarum quæ historiæ mandantur, aut tanquam materia prima Philosophiæ. Nobilissimus autem finis historiæ naturalis is est; ut sit inductionis veræ et legitimæ supellex atque sylva; atque satis trahat ex sensu ad instruendum intellectum. Illa enim altera, quæ aut narrationum jucunditate delectat aut experimentorum usu juvat, atque hujusmodi voluptatis aut fructus gratia quæsita est, inferioris profecto notæ est et genere ipso vilior, præ ea cujus ea est vis et qualitas, ut propria sit parasceve ad condendam philosophiam. Hæc enim demum ea est historia naturalis quæ veræ et activæ philosophiæ solida et æterna basis constituitur, quæque lumini naturæ puro et minime phantastico primam accensionem præbet; cujus quoque neglectus, et Genius non placatus, acies illas larvarum ac veluti regna umbrarum quæ in philosophiis volitare cernuntur, eum maxima et calamitosa operum sterilitate, nobis pessimo fato immisit. Affirmamus autem et plane testamur, historiam naturalem, qualis in ordine esse debeat ad istum finem, non haberi, sed desiderari, atque inter omissa poni oportere. Neque vero acicm mentis alicujus perstringant aut magna antiquorum nomina aut magna novorum volumina, ut querelam istam nostram minus justam cogitet. Satis enim scimus haberi historiam naturalem, mole amplam, varietate gratam, diligentia sæpius curiosam. Attamen si quis ex ea fabulas, et antiquitatem, atque authorum citationes et suffragationes, lites item inanes et controversias, philologiam denique et ornamenta eximat (quæ ad convivales sermones hominumque doctorum noctes potius quam ad

instituendam philosophiam sunt accommodata), profecto ad nihil magni res recidat.[1] Itaque thesaurus quidam potius ad eloquentiam a nonnullis quam solida et fida rerum narratio quæri et parari videtur. Præterea, non multum ad rem faciat memorare aut nosse florum iridis aut tulupæ, aut etiam concharum aut canum aut accipitrum, eximias varietates. Hæc enim et hujusmodi nil aliud sunt quam naturæ lusus quidam et lascivia, et prope ad individuorum naturam accedunt. Itaque habent cognitionem in rebus ipsis exquisitam; informationem vero ad scientias tenuem et fere supervacuam. Atque hæc sunt tamen illa in quibus naturalis historia vulgaris se jactat. Cum autem degeneraverit historia naturalis ad aliena, et rursus luxuriata sit in superfluis; tamen e contra magnæ utique et solidæ ejusdem partes aut prorsus prætermissæ sunt, aut negligenter et leviter tractatæ. Universa vero inquisitione sua et congerie nullo modo ad eum quem diximus finem (condendæ scilicet philosophiæ) apta et qualificata reperitur. Id in membris ipsius optime apparebit, atque ex comparatione ejus historiæ cujus descriptiones hominibus sub oculos jam proponemus, ad eam quæ habetur.

CAPUT IV.

Incipit tractatus qualis esse debeat historia desiderata; nempe Historia Naturalis ad condendam Philosophiam. *Id ut clarius explicetur, primo subjungitur partitio* Historiæ Generationum. *Ejus constituuntur partes quinque. Prima,* cœlestium, *Secunda,* meteororum; *Tertia,* terræ et maris, *Quarta,* collegiorum majorum, sive elementorum aut massarum. *Quinta,* collegiorum minorum *sive* specierum. *Historia vero* virtutum primarum *rejicitur, donec explicatio primæ illius partitionis* Generationum, Prætergenerationum, *et* Artium, *sit absoluta.*

Quanquam vero e fide nostra esse censemus, hujus ipsius historiæ quam desideramus confectionem non aliis relinquere, sed nobis ipsis desumere, propterea quod quo magis hæc res omnium industriæ patere videatur, eo major subest metus ne ab instituto nostro aberrent; ideoque eam ut tertiam Instaurationis nostræ partem designavimus; tamen ut institutum nostrum de explicationibus sive repræsentationibus omissorum perpetuo

[1] So in the original. It should probably be *recidet.* — *J. S.*

servemus, atque etiam si quid nobis humanitus acciderit, ut aliquid in tuto positum sit, sententiam nostram et consilia de hac re jam hoc loco subjungere visum est. Historiæ Generationum, sive Naturæ Solutæ, quinque partes constituimus. Eæ sunt historia Ætheris. Historia Meteororum et Regionum quas vocant Aëris. Etenim tractum sublunarem ad superficiem usque terræ et corpora in eo locata, historiæ meteororum attribuimus. Etiam cometis cujuscunque generis (utcunque se habeat rei veritas) tamen ordinis causa locum inter meteora assignamus. Tertio subit historia Terræ et Maris, quæ conjuncta globum constituunt unicum. Atque hucusque rerum natura distribuitur ex locis et locatis: reliquæ duæ partes substantias rerum distinguunt, vel massas potius. Congregantur enim corpora connaturalia ad majores et minores massas: quæ Collegia rerum majora et minora appellare consuevimus, habentque in politia mundana rationes inter se tanquam tribus et familiæ. Itaque quarto ordine ponitur historia Elementorum sive Collegiorum Majorum; quinto et ultimo historia Specierum sive Collegiorum Minorum. Elementa enim eo sensu accipi volumus, ut intelligantur non exordia rerum, sed tantum corporum connaturalium massæ majores. Majoritas autem illa accidit propter texturam materiæ facilem, simplicem, obviam et paratam; cum species a natura parce suppeditentur, propter texturam dissimilarem, atque in plurimis organicam. Virtutum vero illarum, quæ in natura censeri possint tanquam Cardinales et Catholicæ, Densi, Rari, Levis, Gravis, Calidi, Frigidi, Consistentis, Fluidi, Similaris, Dissimilaris, Specificati, Organici, et similium, una cum motibus ad illa facientibus, uti Antitypiæ, Nexus, Coitionis, Expansionis, et reliquorum (quorum historiam omnino congeri et confici volumus, etiam priusquam ad opus intellectus deveniatur) virtutum et motuum historiam, ejusque conficiendæ modum, tum tractabimus, postquam explicationem triplicis illius partitionis, Generationum, Prætergenerationum, et Artium absolverimus. Neque enim eam scilicet intra triplicem illam nostram partionem inclusimus, cum non proprie sit historia, sed inter historiam et philosophiam veluti terminus medius. Jam vero de Historia Cœlestium, et deinceps de reliquis dicemus atque præcipiemus.

CAPUT V.

Resumitur tractanda Historia Cœlestium; *qualis et esse debeat in genere, et quod legitima hujusce historiæ ordinatio versetur in triplici genere præceptorum; videlicet, de Fine, de Materia, ac de Modo conficiendæ hujusmodi historiæ.*

Historiam Cœlestium simplicem esse volumus, nec dogmatibus imbutam; sed veluti suspensa vi et doctrina theoriarum; quæque solummodo phænomena ipsa sincera complectatur et separata, quæ jam dogmatibus fere concreverunt; denique quæ narrationes proponat eo prorsus modo, ac si nihil ex artibus astronomiæ et astrologiæ decretum esset, sed experimenta tantum et observationes exacte collecta et perspicue descripta forent. In quo genere historiæ nihil adhuc invenitur, quod nostro respondeat voto. Hujusmodi quiddam tantummodo cursim et licenter attigit Caius Plinius: sed optima foret ea historia cœlestium, quæ ex Ptolemæo et Copernico et doctioribus [1] astronomiæ scriptoribus exprimi et erui possit, si artem experimento plane spolies, adjunctis etiam recentiorum observationibus. Quod si cui mirum videatur, nos tanto labore parta, aucta, emendata, rursus ad primam imperitiam et nudarum observationum simplicitatem retrahere velle; nos vero nulla cum priorum inventorum jactura, tamen longe majus opus movemus; neque enim calculos aut prædictiones tantum meditamur, sed philosophiam; eam scilicet, quæ de superiorum corporum non motu solummodo ejusque periodis, sed substantia quoque et omnimoda qualitate, potestate, atque influxu, intellectum humanum informare, secundum rationes naturales atque indubitatas absque traditionum superstitione et levitate possit; atque rursus in motu ipso invenire atque explicare, non quid phænomenis sit consentaneum, sed quid in natura penitus repertum atque actu et reipsa verum sit. Facile autem quis cernat, et eos quibus terram rotari placet, et eos contra qui primum mobile et veterem constructionem tenuerunt [2], æqua fere et ancipiti phænomenorum advocatione niti. Quin et ille novæ constructionis nostra ætate author, qui solem secundi mobilis, quemadmodum terram primi mobilis, centrum constituit, ut planetæ in propriis suis conversionibus circa solem choreas ducere videantur (quod ex antiquioribus nonnulli

[1] *doctoribus* in the original.—*J. S.*

[2] Compare *Redargutio Philosophiarum*, p. 571. note 1.—*J. S.*

de Venere et Mercurio suspicati sunt), si cogitata ad exitum perduxisset, belle profecto rem conficere potuisse videtur.[1] Neque vero nobis dubium est, quin et aliæ hujusmodi constructiones ingenio et acri cogitatione adinveniri possint. Neque illis qui ista proponunt admodum placet, hæc quæ adducunt prorsus vera esse, sed tantummodo ad computationes et tabulas conficiendas commode supposita. At nostra ratio alio spectat; non enim concinnationes, quæ variæ esse possunt, sed veritatem rei quærimus, quæ simplex est. Ad hoc vero historia phænomenorum sincera viam aperiret[2], infecta dogmate obstruet. Neque illud tacemus, nos in hac ipsa historia cœlestium ad normam nostram facta et congesta, spem per se ponere veritatis circa cœlestia inveniendæ; sed multo magis in observatione communium passionum et desideriorum materiæ in utroque globo. Etenim ista æthereorum et sublunarium quæ putantur divortia, commenta nobis videntur et superstitio cum temeritate; cum certissimum sit complures effectus, veluti expansionis, contractionis, impressionis, cessionis, congregationis ad massas, attractionis, abactionis, assimilationis, unionis, et similium, non solum hic apud nos, sed et in fastigiis cœli et in visceribus terræ locum habere. Atque non alii interpretes magis fidi adhiberi aut consuli possunt, ut intellectus humanus et ad profunda terræ, quæ omnino non cernuntur, et ad alta cœli, quæ plerunque fallaciter cernuntur, penetret. Itaque optime antiqui, qui Proteum illum multiformem, etiam vatem termaximum fuisse retulerunt; qui futura, præterita, et occulta præsentium novisset. Nam qui materiæ passiones catholicas novit, atque per hæc novit quid esse possit, non poterit non nosse etiam quid fuerit, quid sit, et quid futurum sit, secundum summas rerum. Itaque plurimum spei et præsidii ad contemplationem cœlestium in physicis rationibus collocamus: per physicas rationes intelligendo, non eas quæ vulgo esse putantur, sed tantum doctrinam circa illos appetitus materiæ, quos nulla regionum aut locorum diversitas distrahere aut disterminare queat. Neque propterea (ut ad propositum revertamur) ulli diligentiæ parci volumus, quæ circa phænomenorum ipsorum cœlestium narrationes et observationes possit impendi. Nam quanto uberior suppetat apparentiarum hujusmodi copia, tanto omnia erunt et magis in promptu et firmiora. De quo

[1] The reference is to Tycho Brahe, and by *nonnulli ex antiquis* Bacon probably meant Martianus, Capella, and Vitruvius.

[2] So in the original. It should probably be *aperiet*. — *J. S.*

antequam plura dicamus, est plane quod gratulemur et mechanicorum industriæ, et doctorum quorundam hominum curæ et alacritati, quod jam nuper per instrumentorum opticorum veluti scaphas et naviculas nova tentari cœperint cum cœlestibus phænomenis commercia. Atque hoc inceptum et fine et aggressu nobile quoddam et humano genere dignum esse existimamus: eo magis quod hujusmodi homines et ausu laudandi sint et fide; quod ingenue et perspicue proposuerunt quomodo singula illis constiterint. Superest tantum constantia cum magna judicii severitate, ut et instrumenta mutent, et testium numerum augeant, et singula et sæpe experiantur et varie, denique ut et sibi ipsi objiciant et aliis patefaciant quicquid in contrarium objici possit, et tenuissimum quemque scrupulum non spernant; ne forte illis eveniat, quod Democrito et aniculæ suæ evenit circa ficus mellitas, ut vetula esset philosopho prudentior, et magnæ et admirabilis speculationis causæ subesset error quispiam tenuis et ridiculus. At ista tanquam præfati in genere, accedamus ad descriptionem historiæ cœlestium magis explicatam; ut ostendamus quæ et qualia circa cœlestia quæri oporteat. Primo igitur quæstiones naturales, aut saltem ex iis nonnullas easque præcipuas proponemus: iis usus humanos quales verisimile est ex cœlestium contemplatione educi posse adjiciemus; hæc utraque tanquam historiæ scopum; ut quibus historiam cœlestium componere curæ erit norint quid agatur, easque quæstiones una cum operibus illis et affectis habeant in animo et intueantur; unde talem instituant et parent historiam, qualis ad judicia hujusmodi quæstionum, et præbitionem hujusmodi fructus et utilitatum erga genus humanum, sit accommodata. Quæstiones autem intelligimus ejus generis, quæ de facto naturæ quærant, non de causis. Hoc enim pertinet proprie ad historiam. Deinde distincte monstrabimus in quibus Historia Cœlestium consistat, quæque ejus sint partes; quæ res sint apprehendendæ aut exquirendæ, quæ experimenta sint comparanda et procuranda, quæ observationes adhibendæ et pensitandæ, proponentes tanquam Topica quædam inductiva, sive Articulos ad interrogandum de cœlestibus. Postremo præcipiemus nonnulla non solum de eo quod quæri oporteat, sed et de hoc, quomodo quæsita debeant pensitari, etiam exhiberi atque in literas referri, ne primæ inquisitionis diligentia pereat in successione, aut, quod pejus est, infirmis et fallacibus initiis nitantur progressus qui sequentur.

In summa, dicemus et ad quid quæri debeat circa cœlestia, et quid, et quomodo.

CAPUT VI.

Quod quæstiones philosophicæ circa cœlestia, *etiam quæ præter opinionem sunt, et quodammodo duræ, recipi debeant: proponuntur vero quinque quæstiones circa systema ipsum; videlicet,* an sit systema; *et, si sit,* quod sit centrum ejus, *et* qualis profunditas, *et* qualis connexio, *et* qualis partium collocatio.

Existimabimur autem plerisque proculdubio reliquias quæstionum veterum, jam pridem quasi tumulo conditas et sepultas, rursus eruere, et fere manes earum evocare, iisque novas insuper quæstiones adspergere. Sed cum ea quæ adhuc habetur circa cœlestia philosophia nihil habeat firmitudinis; cumque illud nobis perpetuo ratum et fixum sit, omnia novo legitimæ inductionis judicio sistere; cumque si forte quæstiones aliquæ a tergo relinquantur, tanto minus operæ et diligentiæ consumetur in historia, propterea quod supervacuum fortasse videbitur ea inquirere de quibus quæstio non fuerit mota; necesse habemus quæstiones, quas ubique porrigit rerum natura, in manus accipere. Quin quo minus[1] certi sumus de quæstionibus per viam nostram determinandis, eo nos minus difficiles præbemus in iisdem recipiend's. Exitum enim rei videmus. Prima igitur ea quæstio est, *An sit systema?* Hoc est, An mundus sive universitas rerum sit globosa secundum totum, cujus sit centrum aliquod? An potius globi particulares terræ et astrorum spargantur; et singuli suis hæreant radicibus, absque systemate et medio sive centro communi? Atque certe jactavit schola Democriti et Epicuri, authores suos mœnia mundi diruisse.[2] Neque tamen id prorsus secutum est ex iis, quæ ab illis dicta sunt. Nam Democritus cum materiam sive semina copia infinita, attributis et potestate finita, eademque agitata, nec ab æterno quovis modo locata, posuisset, vi ipsa illius opinionis adductus est, ut mundos multiformes, ortui et interitui obnoxios, alios melius ordinatos, alios male hærentes, etiam tentamenta mundorum et intermundia statueret. Sed tamen ut hoc receptum

[1] So in the orignal.—*J. S.*

[2] See Lucretius, i. 957., for the infinitude of the universe; and compare his praise of Epicurus:—

"vivida vis animi pervicit et extra
Processit longe flammantia mœnia mundi."

De Rer. Nat. i. 73.

fuisset, nihil officiebat quin illa pars materiæ quæ deputata est huic ipsi mundo, qui nostro generi est conspicuus, obtinuerit figuram globosam. Necesse enim fuit ut singuli ex illis mundis figuram aliquam accepissent. Etsi enim in infinito medium aliquod esse nequeat, tamen in partibus infiniti rotunda figura subsistere potest, non minus in mundo aliquo quam in pila. Verum Democritus sector mundi bonus fuit, in integralibus autem mundi etiam infra mediocres philosophos. At opinio illa de qua nunc loquimur, quæ destruebat et confundebat systema, fuit Heraclidis Pontici, et Ecphanti, et Nicetæ Syracusani, et præcipue Philolai, atque etiam nostra ætate Gilberti, et omnium (præter Copernicum) eorum qui terram planetam et mobilem, et tanquam unum ex astris, crediderunt.[1] Atque illa opinio hanc vim habet, ut planetæ et stellæ singulæ, atque etiam aliæ innumeræ quæ conspectum nostrum ob distantiam fugiunt, necnon aliæ quæ nobis sunt invisibiles propter naturam non lucentem sed opacam, suos quæque sortitæ globos et formas primarias, per expansionem istam quam suspicimus immensam, sive vacui sive corporis cujusdam tenuis et fere adiaphori, tanquam insulæ in pelago immenso spargantur et pendeant, atque super centrum non commune aliquod, sed quæque globi sui proprii volent; aliæ simpliciter, aliæ cum motu nonnullo centri progressivo. Atque illud maxime durum est in hac opinione, quod tollunt quietem sive immobile e natura.[2] Videtur autem, quemadmodum sunt in universo corpora quæ rotant, id est, motu feruntur infinito et perpetuo, ita et ex opposito debere

[1] All the persons here mentioned affirmed that the earth moved, but their opinions are not accurately represented. Thus Ecphantus and Heraclides denied that the earth changes its place. According to them it moves, but *οὐ μήν γε μεταβατικῶς* (*Plutarch, De Placit. Philos.* iii. 13.): and with respect to Ecphantus we are expressly told by the pseudo-Origen, *Philos.* c. 15., that he affirmed *τὴν γῆν μέσον κόσμου κινεῖσθαι περὶ τὸ αὐτῆς κέντρον, ὡς πρὸς ἀνατολήν*: so far was he from rejecting the notion of a *κόσμος* or system. Philolaus undoubtedly admitted the motion of the earth through space, and so probably did Nicetas, or rather Hicetas; but neither of them rejected the notion of a system. For Philolaus, see Boeckh's *Philolaus* and the second dissertation *De Platonico Systemate.* The Philolaic system (although Martin appears to doubt it) was probably the same as that of the Pythagoreans in general. According to it, neither the earth nor the sun are at rest, but, with the planets, revolve about a central fire, the light from which is reflected to us from the sun. It never reaches us directly, because between us and it revolves the Antichthon, which is either a separate planet, or simply the other side of the earth, for the point does not seem quite settled. The passage in the text is apparently taken from Gilbert, *De Magnete*, vi. 3. Heraclides, though he did not believe in the earth's moving through space, yet affirmed, as did also the Pythagoreans, that each of the heavenly bodies constitutes a *κόσμος* in itself. See Stobæus, Ec. Phys. i. 25. On the other hand, Philolaus and Ecphantus distinctly asserted the unity of the universe. See Stobæus, ubi supra, i. 16. and 23.

[2] Yet Bacon would have found, by referring to Cicero, that Nicetas at least denied that any part of the universe except the earth is in motion.

esse corpus aliquod quod quiescat: quibus interponitur media natura eorum quæ feruntur recta, cum motus rectus partibus globorum conveniat, et rebus exulantibus extra patrias suas, quæ ad globos connaturalitatis suæ movent, ut cum iis unitæ ipsæ quoque aut rotent aut quiescant. Verum huic quæstioni (nempe *an sit systema*) finem dabunt ea quæ circa motum terræ, *an* scilicet *terra stet aut rotet?* atque circa substantiam astrorum, *an sit solida aut flammea*, et circa æthera sive spatia cœli interstellaria, *an sint corporea aut vacua*, decerni poterunt. Nam si terra stet, et cœli motu diurno circumvolvantur, proculdubio est systema; quod si terra rotet, tamen non prorsus evincitur non esse systema, propterea quod aliud possit poni centrum systematis, videlicet sol, aut aliud quippiam. Rursus, si unicus globus terræ sit densus et solidus, videtur materia universi coire et densari ad centrum illud: quod si inveniantur luna aut alii ex planetis constare etiam ex materia densa et solida, videntur ex eo coire densa non ad centrum aliquod, sed sparsim et quasi fortuito. Postremo, si ponatur vacuum coacervatum in spatiis interstellaribus, videntur globi singuli habere circa se effluvia tenuiora, et deinde vacuum.[1] Quod si et illa spatia corpore replentur, videtur esse unio densorum in medio, et rejectio tenuiorum ad circumferentiam. Plurimum autem confert ad scientias, nosse conjugationes quæstionum, propterea quod in aliquibus invenitur historia sive materia inductiva ad eas dirimendas, in aliquibus non item. Dato vero systemate, proxime accedit quæstio ea secunda, *quod sit centrum systematis?* Enimvero si aliquis ex globis locum centri occupare debeat, occurrunt globi imprimis duo, qui naturam medii sive centri præferre videntur, Terra et Sol. Pro Terra suffragantur aspectus noster et inveterata opinio, atque illud omnium maxime, quod cum densa coëant in angustum, rara in latum diffundantur (area autem omnis circuli contrahatur ad centrum), videtur sequi quasi necessario, ut angustiæ circa medium mundi statuantur, ut proprius locus et tanquam unicus ad corpora densa. Pro Sole autem facit ratio illa, quod cujus partes sunt in systemate maximæ et potissimæ, ei is locus assignari debeat ex quo ipse in universum systema maxime agere et se communicare possit. Quando vero is sit sol, qui mundum vivificare plurimum videatur, impertiendo calorem et lucem; rite omnino atque ordine videri

[1] Compare Gilbert, Physiol. ii. 27.

possit collocatus in medio mundi. Accedit et illud, quod sol manifeste habeat assectatores Venerem et Mercurium[1], etiam ex sententia Tychonis planetas reliquos; adeo ut plane videatur sol centri naturam sustinere posse, et vices gerere in aliquibus; eo propius abest, ut universi centrum constitui possit; quæ Copernici assertio fuit. Veruntamen in systemate Copernici multa et magna inveniuntur incommoda; nam et quod triplici motu terram oneravit[2], incommodum magnum, et quod solem a cœtu planetarum divulsit, cum quibus tot habet passiones communes, similiter durum; et quod tantum immobilis introduxit in naturam, ponendo solem et stellas immobiles, præsertim corpora maxime omnium lucida et radiantia; et quod lunam terræ tan-

[1] It is difficult to see why Bacon should speak of this as manifest; the theory that Mercury and Venus are satellites of the sun constitutes a distinct system, often called the Egyptian. See with respect to it Martin, *Etudes*, &c., vol. ii. p. 129. According to Gassendi, Copernicus was much struck by the passage of Martianus Capella in which this system is mentioned. Apelt has remarked that the Copernican system includes two distinct elements: the first the reference of the motion of the planets to the sun as a common centre; the second the doctrine of the motion of the earth. The first was common to Copernicus with Tycho Brahe; the second was his own exclusively. Tycho's system, as Apelt well observes, is the natural transition from Ptolemy's to the Copernican, and must of necessity have been arrived at as soon as the true distances between the sun and the planets were introduced into the Ptolemaic hypothesis. Thus Tycho's system is a step backwards, although it saved the phenomena as well as that of Copernicus; but, as Apelt goes on to remark, Tycho was an observer, and Copernicus a philosopher, who sought not merely for an astronomical hypothesis, but for a new idea of the universe. Copernicus says of himself, that he had set the sun, the great light of the universe, in the midst of the temple of nature, and as on a kingly throne. No man less deserved to be spoken of as a merely calculating astronomer. Bacon's difficulty, that in the Copernican system the moon revolves about the earth, had been felt by others. Galileo, at the end of the *Sydereus Nuncius*, points out the analogy of this hypothesis with what he had discovered to be the case with respect to Jupiter and his satellites, remarking that it removed the difficulty in question.

[2] Copernicus conceived the earth's motion round the sun to be as if the earth were rigidly attached to the line which joins them. Thus the motion round the sun results from the composition of two simpler motions, namely that of the earth's centre and the change of the direction of its axis. The second of these components is eliminated from the hypothesis by supposing that the earth, besides the motion round the sun and about its own axis, has a third motion, namely a change in the direction of its axis equal and opposite to that which results from the motion round the sun. Galileo showed, by an illustrative experiment, that this kind of motion was in reality only an unnecessary complication; and Gilbert also makes the same remark. See the Saggiatore, ii. 304., and the Physiol. Nova. In Germany the same thing was remarked by Rothman; but I am not aware whether he or Gilbert was the first person to introduce the simplification, which is indeed obvious. Nevertheless the notion of a triple motion long adhered to the Copernican hypothesis. See Paradise Lost, viii. 130. Of course the earth's axis really has a third motion which gives rise to the phenomena of precession and mutation; but this is exceedingly slow. In justice to Copernicus it should be added, that though his notion of an annual third motion was unnecessary, yet he employed it, and in a correct manner, to explain precession. Boeckh's notion that the movement of the fixed stars in the theory of Philolaus was introduced for the same purpose, does not seem to be well made out. No doubt, as the earth revolved every day round Hestia, the fixed stars might have been allowed to remain at rest; but we have a remarkable example of a similar pleonasm in the astronomical theory of Cardinal Cusanus. See the fragment of Cusanus first published by Clemens in 1843: it is given *in extenso* in Apelt on the Reformation of Astronomy, p. 23.

quam in epicyclo adhærere voluit; et alia nonnulla quæ ille sumit, ejus sunt viri qui quidvis in natura fingere, modo calculi bene cedant, nihil putet. Quod si detur motus terræ, magis consentaneum videatur, ut tollatur omnino systema, et spargantur globi, secundum eos quos jam nominavimus, quam ut constituatur tale systema cujus sit centrum sol. Idque consensus seculorum et antiquitatis potius arripuit et approbavit. Nam opinio de motu terræ nova non est, sed ab antiquis repetita, quemadmodum diximus; at illa de sole ut sit centrum mundi et immobile, prorsus nova est (excepto uno versiculo male traducto)[1], et primo a Copernico introducta. Sequitur tertia quæstio de profunditate systematis; non ut aliqua ejus mensura capiatur perfecta, sed ut in certo ponatur, *an cœlum stellatum sit instar unius regionis, sive ut vulgo loquuntur, orbis? an vero stellæ fixæ quas vocant, sint aliæ aliis sublimiores immensa quadam profunditate?* Neque enim ullo modo fieri potest, ut illæ sint paris altitudinis, si hoc intelligatur exacte; stellæ enim proculdubio non sunt sitæ tanquam in plano, quæ habeant dimensionem quandam

[1] Bacon alludes to Job, ix. 6. On this verse, "Qui commovet terram de loco suo et columnæ ejus concutiuntur," Didacus à Stunicâ, in his Commentary on Job, published in 1584, founded an argument in favour of the Copernican hypothesis, alledging that no text could be found in which the earth's motion is as distinctly denied as it is here asserted:—"Nullus dabitur scripturæ sacrosanctæ locus qui tam aperte dicat terram non moveri quam hic moveri dicit."—*Stunicâ on Job*, p. 41. (I quote from the edition of 1591). This argument of Stunica's seems to have attracted some attention. Galileo mentions it in his letter to the Grand Duchess Christina, which was written about 1615. See the new edition of his works (Florence, 1843), ii. p. 52. The passage of Stunica's Commentary in which it occurs is inserted in Salisbury's *Mathematical Collections and Translations* (1661), which contains, beside a translation of the *Dialogi dei Sistemi*, translations of certain tracts on the religious question involved in the Copernican controversy. — I am not sure, though *versiculus* is an odd expression for anything except a verse in the Bible, that M. Bouillet is not right in thinking that the reference is to what is said of Philolaus by Plutarch, *De Placit. Phil.*, which (as Apelt has remarked) Copernicus has always mistranslated, confounding the central fire, the seat of the gods, with the sun. See Apelt's Reformation of Astronomy, 1852, p. 128.

Apelt altogether agrees with Bacon as to the complete originality of Copernicus, and, apparently forgetting what is said of Aristarchus by Archimedes and others, says that the idea of the annual movement of the earth sprang out of the mind of Copernicus, as Minerva from the head of Jupiter. But yet, as Humboldt has remarked, he may have been acquainted with the doctrine of Aristarchus. See *Cosmos*, vol. ii. p. 349. Bacon was not, or he would not have said that the immobility of the sun was, "excepting one versicle," a wholly new doctrine.

A third hypothesis as to Bacon's meaning is that he refers to some passage in which the sun is spoken of as τὸ μέσον, as Boeckh has pointed out in his *Commendatio Academica altera de Platonico Systemate*, &c. The sun is sometimes called μέση on musical grounds, and sometimes spoken of as μέσον πάντων, simply because it occupies a middle place among the planets. Such a passage occurs in the *Placit. Phil.*; and it is perhaps to this that Bacon refers. Compare Martin, *Etudes sur le Timée*, vol. ii. pp. 103. and 128. I have not seen Gruppe's recent work on the Cosmical System of the Ancients. The notion that Plato was the first proposer of the Copernican system seems altogether unfounded. According to Apelt, Gruppe relies on a passage in the seventh book of the *De Legibus*.

tantum in superficie instar macularum aut bullarum, sed sunt illæ globi integri, magni atque profundi. Itaque cum tam disparis reperiantur esse magnitudinis, omnino necesse est ut aliæ promineant vel sursum versus vel deorsum, nec fieri potest ut aut per superiora aut inferiora una conjungantur superficie. Hoc vero si fiat in partibus stellarum, temerarium plane esset asserere, etiam in corpore integro, stellas non esse alias aliis altiores; sed ut hoc verum sit, tamen asseri potest crassities quædam definita (licet insignis) ejus regionis quæ vocatur sphæra sive cœlum stellatum, quæ hujusmodi prominentias et altitudinis gradus quodammodo terminet: videmus enim ex apogæis et perigæis planetarum, singulis eorum cœlis competere crassitiem notabilem, per quæ ascendant et descendant. At quæstio ista tantum eo spectat, utrum stellæ aliæ sint super alias, tanquam planeta super planetam, et quasi in diversis orbibus. Atque hæc quæstio illi alteri quæstioni, de motu aut statu terræ, similiter affinis est. Nam si stellæ moveantur motu diurno circa terram, quandoquidem eæ universæ pari incitatione et uno veluti spiritu agantur, (cumque in planetis plane constet, prout variatur in sublimitate et humilitate situs, ita etiam variari in celeritate et tarditate motus) probabile est stellas, velocitate cursus pares, etiam in una regione ætheris locari, cujus licet crassities sive profunditas ponatur esse magna, tamen non sit tanta ut faciat ad discrimen incitationis sive celeritatis in motu; sed ut per eam regionem universam omnia putentur tanquam vinculo connaturalitatis devincta pariter rotare, vel saltem cum discrepantia tali, quæ ad aspectum nostrum propter distantiam deferri non possit. Quod si terra moveatur, stellæ vel stare poterunt, quod Copernico placuit, aut, quod longe magis verisimile est, et a Gilberto introductum, illæ poterunt singulæ rotare super centrum suum in loco suo, absque aliquo motu centri sui, quemadmodum et ipsa terra; si modo illum motum diurnum terræ ab adscititiis illis duobus motibus, quos Copernicus superaddidit, sejungas.[1] Utrum vis autem horum si fiat, nihil prohibet, quin stellæ aliæ supra alias sint donec aspectum nostrum effugiant. Quarta proponitur quæstio *de nexu sive connexione systematis.* Atque de natura et essentia corporis vel

[1] "Manifestum ergo est quod sydera omnia tanquam in distinctis reposita locis in ipsis conglobantur, quæ centris propriis nituntur et circa ipsa confluunt partes eorum omnes. Quod si motum habent, erit ille potius circa proprium cujusque centrum, ut terræ motus, aut centri progressione in orbem, ut Lunæ; non erit in tam numerosâ solutâ grege circularis motus."— *Gilbertus, De Magnete,* vi. 3.

rei quæ æther purus censetur, et astris interjacet, postea inquiremus. Nunc tantum de cohærentia systematis dicemus. Ejus rei ratio est triplex. Aut enim datur vacuum, aut contiguum, aut continuum; itaque primo quæritur, *an sit vacuum coacervatum in spatiis interstellaribus?* Id quod Gilbertus diserte posuit [1], atque etiam antiquorum nonnulli ex iis qui globos spargi sine systemate opinati sunt innuere videntur; præsertim ii qui astrorum corpora compacta asseruere. Opinio talis est: Globos universos, tam astra quam terram, ex materia solida et densa constare: illos autem in proximo circumdari genere quodam corporum, quæ sint ipsi globo aliquatenus connaturalia, sed tamen magis imperfecta, languida, et attenuata, quæque nil aliud sint quam globorum ipsorum effluvia et emanationes; qualia sunt vapores et halitus, atque adeo aër ipse, si conferantur terræ: hæc effluvia ad distantiam circa unumquemque globum non magnam pertingere: reliquum intervallum (quod longe amplissimum est) inane esse. Cui opinioni illud fidem astruere possit, quod ex tam immensa distantia corpora astrorum conspiciuntur. Si enim universum illud spatium plenum esset, præsertim corporum quæ proculdubio raritate et densitate valde inæqualia sunt, tanta foret radiorum refractio, ut ad visum nostrum pertingere non possint; quam si longe maxima ejus spatii pars vacua sit, facilius sane perferri consentaneum est. Atque revera hæc quæstio magna ex parte pendebit ex quæstione quam statim adducemus de substantia stellarum, *An sit densa, vel tenuis et explicata?* Nam si substantia earum sit solida, videbitur utique natura circa globos eorumque confinia tantummodo fere occupata esse et solicita; spatia vero interjacentia deserere et tanquam prætermittere. Itaque non absimile vero fuerit, globos circa centrum spissiores, circa superficiem laxiores, in ambientibus et effluviis quasi deficientes, in vacuo tandem terminari. Contra, si natura astrorum sit tenuis et flammea, apparebit naturam Tenuis non esse solummodo Densi decrementum, sed per se potentem et primariam, non minus quam naturam solidi; eamque et in stellis ipsis et in æthere et in aëre vigere, ut vacuo illo coacervato non sit opus. Pendebit quoque ista quæstio de vacuo in spatiis interstellaribus ex quæstione illa, quæ pertinet ad principia naturæ, *An detur vacuum?* Neque tamen hoc

[1] Gilbert, Physiol. Nova, i. 22., particularly at p. 68.

ipsum nisi adhibita distinctione. Aliud enim est negare vacuum simpliciter, aliud negare vacuum coacervatum. Longe enim firmiores sunt eæ rationes, quæ adduci possunt ad astruendum vacuum intermistum ad laxamentum corporum, quam quæ asserunt vacuum coacervatum, sive in spatiis majoribus. Neque hoc solum vidit Hero[1], vir ingeniosus et mechanicus, sed etiam Leucippus et Democritus, inventores opinionis de vacuo, quam Aristoteles argutiis quibusdam obsidere et expugnare conatur; qui duo philosophi acutissimi certe et celeberrimi, ita vacuum intermistum dant, ut vacuum coacervatum tollant. Ex sententia enim Democriti vacuum terminatur et circumscribitur, ut ultra certos fines non detur distractio sive divulsio corporum, non magis quam compulsio aut compactio.[2] Licet enim in iis quæ ex Democrito habemus hoc nunquam diserte positum sit, tamen hoc dicere videtur, cum corpora æque ac spatia infinita constituit; ea usus ratione, aliter (si spatium scilicet infinitum, corpora finita essent) corpora nunquam hæsura. Itaque propter co-infinitatem materiæ cum spatio, necessario compingitur vacuum ad terminos certos, quæ videtur ejus fuisse opinio vera et recte intellecta, ut scilicet constituatur finis quidam explicationis sive expansionis corporum per vacuum copulatum; neque vacuum detur solitarium, aut corpore non obsessum. Quod si non detur vacuum instar solutionis continuitatis in systemate, tamen cum tanta inveniatur in partibus et regionibus systematis corporum diversitas, ut sint tanquam alterius gentis et patriæ, oritur quæstio secunda quæ ad connexionem systematis pertineat; ea est, *an æther purus sit unus perpetuus sive continuus fluor, an vero constet ex pluribus contiguis?* Neque vero nostrum est de verbis argutari, sed intelligimus per contiguum, corpus quod superjacet nec miscetur: neque rursus intelligimus contignationem duram, qualem vulgus astronomorum comminiscitur, sed qualem possint recipere fluores, ac si argento vivo supernataret aqua, aquæ oleum, oleo aër. Nemini enim dubium esse potest, quin in immenso illo tractu ætheris puri sint eximiæ differentiæ quoad raritatem et densitatem et alia non pauca; sed utro libet dato (id est, continuo sive contiguo) hoc fieri potest. Nam satis constat, nec in mari ipso aquam in summo et aquam in imo ejusdem esse consistentiæ et saporis; in aëre vero, inter

[1] See Hero. Spiritalia, Proëm.

[2] See Lucretius, i. 983. et seq.

aërem terræ conterminum et aërem superiorem plurimum interest, et tamen unus et integer est et perpetuus fluor. Itaque deducitur quæstio ad hoc, *utrum differentiæ in tractu ætheris puri se insinuent gradatim et fluxu quodam continuo; an constituantur et distribuantur ad certos et notabiles limites, ubi corpora conjunguntur quæ non sint commiscibilia, quemadmodum apud nos aër incumbit aquæ.* Enimvero simplicius contemplanti videtur totum istud purum et liquidum corpus in quo globi terræ et astrorum, tanquam in vastissimo pelago, pendent et natant, quodque interjunctum illis globis quanto ipso et spatio quod occupat globorum mensuras quasi innumeris partibus superat, esse indivisa quædam res et summe unita. Verum naturam diligentius intuenti illud plane constabit, consuesse naturam ad spatia nonnulla per gradus, deinde subito per saltus procedere, atque hunc processum alternare. Aliter, si quis vere introspiciat, nulla possit constitui fabrica rerum, nulla figura organica, si per gradus insensibiles perpetuo procederetur. Itaque processus ille per gradus intermundiis competere possit, non mundo, ad cujus constructionem necesse est longe dissimilia discludi alia ab aliis, et tamen approximari. Itaque terram et aquas excipit et contingit aër, corpus longe diversum, et tamen in proximo locatum; non primo limus, deinde vapor aut nebula, dein aër purus; sed confestim aër absque medio. In aëre vero et æthere (illa enim duo conjungimus) dispertitio maxime omnium insignis et radicalis sumi posse videtur, ex natura magis aut minus susceptiva naturæ stellaris. Itaque tres secundum genera videntur esse regiones maximæ notabiles a globo terræ ad fastigia cœli; nimirum tractus aëris, tractus cœli planetarum, et tractus cœli stellati. Atque in infimo tractu natura stellaris non consistit; in medio consistit, sed coit ad globos singulos; in supremo spargit se per globos plurimos, adeo ut per summitates ejus videatur transire quasi in empyreum integrum. Neque interim obliviscendum ejus quod paulo ante diximus, consuesse naturam processum graduatum et persultorium alternare, adeo ut regionis primæ confinia communicent cum secunda, et secundæ cum tertia. Nam et in aëre sublimiore, postquam aër cœperit esse ab effluviis terræ defæcatior et a cœlestium magis attenuatus, tentat et experitur consistere flamma; ut in cometis humilioribus fit, qui sunt mediæ cujusdam naturæ inter naturam stellarem consistentem et evanidam; et rursus videtur cœlum

circa solem fortasse stellescere, et transire incipere in naturam cœli stellati. Nam possint illæ maculæ quæ in sole observatione certe fida et diligenti deprehensæ sunt, esse rudimenta quædam materiæ stellaris; at in cœlo Jovis etiam stellæ absolutæ et perfectæ conspiciuntur, licet propter parvitatem absque commoditate perspicillorum invisibiles[1]; et rursus in summitatibus cœli stellati ex innumeris micationibus ætheris inter stellas numeratas (cujus aliæ causæ satis frigidæ reddi solent) videtur natura stellaris magis fundi et continuari.[2] Verum de his in quæstionibus quas mox proponemus de substantia et astrorum et cœli interstellaris plura dicemus. Hæc enim quæ diximus pertinent tantum ad quæstiones de nexu systematis. Superest quinta quæstio *de collocatione partium systematis, sive de ordine cœlorum.* Atque dato quod non sit systema, sed sparguntur globi; aut dato quod sit systema, cujus sit centrum sol; aut etiamsi videant astronomi de aliquo novo systemate; tamen manet utique inquisitio, *quis planeta ad alium planetam sit magis propinquus aut remotus;* et similiter *qui planeta magis aut minus elongetur a terra aut etiam a sole.* Quod si recipiatur systema veterum, non videtur causa cur magnopere insistatur inquisitioni novæ de quatuor cœlis superioribus, Stellarum Fixarum scilicet, Saturni, Jovis, et Martis. Nam de eorum positura atque ordine, et seculorum consensus suffragatur, nec phænomenon ullum adversatur; atque rationes motuum (unde sumitur de altitudinibus cœlorum præcipua probatio) accommodatæ sunt, et nusquam turbant. Verum de Sole, Venere, et Mercurio, et Luna etiam, secundum systema veterum dubitatum est ab antiquis[3]; atque apud

[1] *invisiles* in the original.—*J. S.*

[2] See the *Sydereus Nuncius* of Galileo, which had just appeared when this tract was written; and compare the following passage in the letter of Sir Wm. Lower to Harriot, written when he had first heard of Galileo's discoveries. "We Traventane philosophers were a consideringe of Kepler's reasons by which he indeavers to overthrow Nolanus and Gilbert's opinions concerninge the immensitie of the sphcare of the starres . . . . Said I (havinge heard you say often as much) what is [if?] in that huge space betweene the starres and Saturne, ther remaine ever fixed infinite numbers which by reason of their lesser magnitudes doe flie our sighte . . . what if about ♃ ♅ ♂ &c., ther move other planets also which appear not. Just as I was saying this comes your letter, which when I had redd, Loe, quod I, what I spoke probablie, experience hath made good." The name "Traventane" is taken from his house Traventi. It probably alludes to the title Consentine philosophers, affected by the disciples of Telesius. Bruno affected to talk of the Nolan philosophy.

[3] It was doubted whether the orbs of Venus and Mercury are superior to the sun's or inferior to it. The former was the older hypothesis and is preferred by Ptolemy; who however remarks that some had dissented from it. See the Megal. Syntaxis, iv. 1. Bacon's information is apparently derived from Patricius, *Pancosmia*, 13.

recentiores quoque de Venere et Mercurio ambigitur, *uter planeta sit altero superior.* Nam pro Venere ut sit superior, stat illa ratio, quod tardius nonnihil movet; et pro Mercurio, quod alligatur ad distantiam propiorem a sole, unde quis asserat debere eum proxime ad solem collocari. De luna vero nemo unquam dubitavit, quin locata sit proxime ad terram, licet variatum sit de appropinquatione ejus ad solem. Neque serio contemplantem fugere debet aliud genus quæstionis, pertinens ad constitutionem systematis; hæc est, *utrum planeta alter alterum per vices supergrediatur quandoque, et quandoque rursus subeat;* id quod de Venere per demonstrationes quasdam non indiligentes evinci videtur, ut illa aliquando inveniatur super solem locata, aliquando subter. Atque omnino recte quæritur, *utrum apogæum humilioris planetæ perigæum superioris non secet, ejusque fines subintret.* Restat ultima quæstio *de collocatione partium systematis,* hoc est, *utrum sint plura et diversa centra in systemate, et plures tanquam choreæ:* cum præsertim non solum Terra primi mobilis, Sol (ex sententia Tychonis) secundi mobilis, verum etiam Jupiter minorum et nuperorum illorum erronum[1] ex Galilæo centrum constituatur. Atque hæ sunt quæstiones illæ quinque, quæ de systemate ipso proponendæ videntur, *An sit* videlicet *systema;* et *quod sit centrum ejus;* et *quanta profunditas;* et *qualis nexus ejus;* et *quis ordo in collocatione partium.*

De extimis vero cœli, et cœlo aliquo empyreo, theses aut quæstiones non conficimus. Neque enim istarum rerum est historia, aut extat phænomenon ullum. Itaque quæ de iis sciri possunt, ea per consecutionem tantum, ac nullatenus per inductionem sciri possunt. Erit igitur talis inquisitionis et tempus congruum, et ratio et modus quidam. De cœlis vero et spatiis immateriatis, religioni omnino standum et permittendum. Quæ enim a Platonicis et nuper a Patritio[2] (ut diviniores scilicet habeantur in philosophia) dicuntur, non sine superstitione manifesta et jactantia et quasi mente turbata, denique ausu nimio, fructu nullo, similia Valentini iconibus[3] et somniis; ea

[1] *errorum* in the original: silently corrected by M. Bouillet.—*J. S.*

[2] Patritius, or rather Patricius, from whom much of the latter part of the present tract is taken, was born at Cherso in 1529, and died in 1597. He wrote a treatise on philosophy — *Nova de Universis Philosophia* — [which was published in 1591]. It is an attempt, of no great value, to conciliate Plato and Aristotle. In the last book, entitled *Pancosmia,* there is some interesting information touching theories of the tides.

[3] [*aconibus* in the original.] Valentinus is the alchemist Basil Valentine. He is said

nos pro rebus commentitiis et levibus habemus. Nullo modo enim ferenda est Moriæ apotheosis, tanquam Divi Claudii:[1] quin pessimum est, et plane pestis et tabes intellectus, si vanis accedat veneratio.

CAPUT VII.

Sequuntur quæstiones de substantia cœlestium; qualis, *videlicet,* sit substantia cœlestium in genere comparata ad corpora sublunaria; et qualis substantia ætheris interstellaris comparata ad corpus stellæ; *et* qualis sit substantia astrorum ipsorum comparata ad invicem, et comparata ad ignem nostrum, et in natura propria; *et* qualis sit substantia galaxiæ et macularum nigrarum in hemisphærio antarctico? *Tum proponitur quæstio prima,* An sit heterogenea inter cœlestia et sublunaria, et qualis ea esse possit?

Absolutis quæstionibus de systemate, pergendum ad quæstiones de substantia cœlestium. Nam de substantia cœlestium inquirit præcipue philosophia, et de causis motus eorum: de motu ipso vero et ejus accidentibus, astronomia: de influxu et potestate, utraque. Debuerat autem esse cautum inter astronomiam et philosophiam, ut astronomia præferat hypotheses quæ maxime expeditæ ad compendia calculorum; philosophia vero quæ proxime accedunt ad veritatem naturæ. Atque insuper, ut astronomiæ hypotheses ad commoditatem suam, rei veritati nullo modo præjudicent, vicissim ut philosophiæ decreta talia sint, quæ sint super phænomena astronomiæ omnino explicabilia. At nunc contra fit, videlicet ut astronomiæ figmenta in philosophiam invecta sint, eamque corruperint; et philosophorum speculationes circa cœlestia sibi tantum placeant, et astronomiam ferè deserant, cœlestia generaliter intuentes, verum ad phænomena particularia atque eorum causas nullo modo se applicantes. Itaque cum utraque scientia (qualis nunc habetur) sit res levis et perfunctoria, fortius omnino figendus est pes; ac si ista duo, quæ propter angustas hominum contemplationes, et usum professorium per tot secula disjungi consueverunt, una

to have been a Benedictine of the congregation of St. Peter's at Erfurdt, and to have lived in the beginning of the fifteenth century. But it seems that the writings which bear his name are spurious. See Sprengel. *Hist. Med.* iii. p. 267., and Morhof, *Polyhistor,* i. p. 84., who mentions that Placcius, in the *Pseudon. Catalog.*, is disposed to deny the existence of any such person, and does not believe that his name could be found either in the provincial catalogue of Benedictines at Erfurdt, or in the general one at Rome.

[1] See the *Ludus de Morte Claudii Cæsaris* of Seneca.

atque eadem res sint, atque in unum scientiæ corpus conflata. Itaque proponitur prima ea quæstio, *An substantia cœlestium sit heterogenea ad substantiam inferiorum?* Nam Aristotelis temeritas et cavillatio nobis cœlum peperit phantasticum, ex quinta essentia, experte mutationis, experte etiam caloris.[1] Atque misso in præsenti sermone de quatuor elementis, quæ quinta essentia illa supponit; erat certe magnæ cujusdam fiduciæ, cognationem inter elementaria, quæ vocant, et cœlestia prorsus dirimere, cum duo ex elementis, aër videlicet et ignis, cum stellis et æthere tam bene conveniant; nisi quod moris erat illi viro ingenio abuti, et sibi ipsi negotium facessere, et obscuriora malle. Neque tamen dubium est, quin regiones sub luna positæ et supra, una cum corporibus quæ sub iisdem spatiis continentur, multis et magnis rebus differant. Neque rursus hoc certius est quam illud, corporibus utriusque regionis inesse complures communes inclinationes, passiones, et motus, ut, salva naturæ unitate, ista distinguere potius debeamus quam discerpere. Quod vero attinet ad illam heterogeniæ partem, ut cœlestia ponantur æterna, inferiora corruptibilia[2]; videtur sententia illa sub utraque parte fallere, quod nec cœlo ea competat æternitas quam fingunt, neque terræ ea mutabilitas. Siquidem de terra vere rem reputanti judicium minime faciendum ex illis quæ nobis sunt conspicua, cum nihil ex corporibus quæ oculus humanus videt erutum sit aut ejectum ex magis profundo quam spatio fortasse trium milliarium ad plurimum; quod res nihili est, collatum ad ambitum globi terrestris universi. Itaque nihil obstat quin intima terræ pari prædita sint æternitate ac ipsum cœlum. Enimvero si terra pateretur mutationes in profundo, fieri non potest quin consequentiæ earum mutationum, etiam in nostra regione quam calcamus, majores casus parituræ fuissent quam fieri videmus. Etenim earum quæ nobis se dant conspiciendas mutationum hic versus superficiem terræ, fere se ostendit quasi semper simul causa aliqua manifesta desuper imposita, ex tempestatibus cœli, per imbres, fervores, et similia; ut terra ipsa ex se et vi propria nulli admodum mutationi causam

[1] Aristotle affirmed that the light and heat referred to the heavenly bodies arises from the mechanical action on the air due to their motion.—*De Cœlo*, ii. 7.

"Quintessentia accipitur a Peripateticis pro Cœlo, quia iis Cœlum neque est calidum neque frigidum neque humidum neque siccum, seu pro essentia sincera et pura ut natura ætheria. Alias, cœlestis substantia, sic dicta quia est aliquid præter elementa nec in crasi horum ortum."—*Goelin, Lex. Phil.* in voce *Essentia.*

[2] Aristot. ubi suprà.

præbere videatur. Quod si concedatur (quod certe verisimile est) etiam terram ipsam, non solum cœlestia, in regiones aëris agere, aut frigora exspirando, aut ventos emittendo, aut hujusmodi alia; tamen et ista omnis varietas referri potest ad regiones terræ ex propinquo, in quibus plurimas evenire mutationes et vices nemo sanus negaverit. Verum fatendum omnino est, ex phænomenis terræ longe maxime penetrare in profundum terræ motus, et, quæ ejus sunt generis, eruptiones aquarum, eructationes ignium, hiatus et abruptiones terrarum, et similia; quæ tamen ipsa videntur non insurgere ex longinquo, cum plurima ipsorum parvum aliquod spatium in superficie terræ occupare soleant. Quanto enim latius spatium in facie terræ occupat terræ motus, sive aliud quippiam hujusmodi, tanto magis radices et origines ejus ad viscera terræ penetrare putandum est; et quanto angustius, minus. Quod si quis asserat[1], fieri quandoque terræ motus qui amplos et spatiosos regionum tractus quatiant, prorsus ita est. At illi certe raro eveniunt, suntque ex casibus majoribus. Itaque æquiparari possunt cometis sublimioribus, qui et ipsi infrequentes sunt. Neque enim id agitur, ut terræ simpliciter asseratur æternitas, sed ut illud appareat (quod initio diximus) inter cœlum et terram, quatenus ad constantiam et mutationem, non multum interesse.[2] Neque operæ pretium est argutari de æternitate ex rationibus motus: quemadmodum enim motus circularis terminis non indiget, ita nec quies; atque æque susceptivum est æternitatis, ut densa in loco et congregatione magna connaturalitatis suæ consistant, quam ut tenuia rotent: cum partes avulsæ amborum ferantur recta. Etiam illud in argumentum sumi potest, quod terræ interiora corruptioni magis obnoxia non sint quam ipsum cœlum; quod ibi aliquid deperire solet, ubi aliquid refici potest. Cum vero imbres, et quæ de alto decidunt, quæ faciem superiorem terræ renovant, nullo modo penetrare possint ad interiora terræ, quæ tamen ipsa stant mole sua, et quanto suo; necessario fieri ut nihil deperdatur, quando nihil adsit quod succedat. Postremo, mutabilitas quæ in extimis terræ deprehenditur, videtur et ipsa per accidens esse. Nam incrustatio illa parva, quæ ad milliaria pauca deorsum extendi videtur (intra quos terminos præclaræ

[1] *afferat* in the original; which has in this part many misprints. — *J. S.*

[2] Compare Telesius, *De Rerum Nat.* i. 11.: "Sol modo terraque . . . nec fieri unquam nec immutari videntur."

illæ officinæ et fabricæ, plantarum nempe et mineralium, concluduntur) nullam fere reciperent varietatem, multo minus tam pulchra et elaborata artificia, nisi ea pars terræ a cœlestibus pateretur et perpetuo vellicaretur. Quod si quis existimet calorem et vim activam solis et cœlestium universæ terræ crassitudinem transverberare posse, is superstitiosus et fanaticus censeri possit; cum liquido pateat quam parvo objectu ea retundi et cohiberi possint. Atque de constantia terræ hactenus: videndum jam de mutabilitate cœlestium.

Primo igitur non ea utendum est ratione, mutationes in cœlo non fieri, quia sub aspectum nostrum non veniunt. Aspectum enim frustrat et loci distantia, et lucis sive excessus sive defectus, et corporis subtilitas aut parvitas; neque enim scilicet si oculus in circulo lunæ positus esset, hic quæ apud nos in superficie terræ fiunt mutationes, veluti inundationes, terræ motus, ædificia, structuras aut moles, cernere posset; quæ parvæ festucæ rationem non exæquant ad tantam distantiam. Neque ex eo, quod cœlum interstellare diaphanum sit, et stellæ noctibus serenis eædem numero et facie cernuntur, quis facile pronunciet universum corpus ætheris limpidum, purum, et immutabile esse. Nam et aër innumeras varietates suscipit, æstus, frigoris, odorum, et omnigenæ misturæ cum vaporibus subtilioribus, neque propterea exuit diaphanum; similiter nec imagini aut faciei illi cœli credendum. Nam si magnæ illæ nubium moles quæ cœlum interdum involvunt, et solis et astrorum conspectum tollunt a nobis propter propinquitatem ipsarum ad visum nostrum, in superioribus cœli partibus penderent, neutiquam illæ faciem cœli sereni mutarent: nam nec ipsæ cerni possent propter distantiam, nec ullam eclipsin facere in astris, propter corporum parvitatem respectu magnitudinis astrorum. Quin et corpus ipsum lunæ, nisi qua parte lumen excipit, faciem cœli non mutat; ut, si lumen illud abesset, tantum corpus nos latere plane posset. At contra liquido patet ex massis corporum quæ mole et magnitudine spatiorum distantiam vincere, et propter materiam luminosam aut splendidam visum nostrum lacessere possint, admirandas in cœlo accidere mutationes atque insolentias. Id enim perspicitur in cometis sublimioribus, iis nimirum qui et figuram stellæ induerunt absque coma, neque solum ex doctrina parallaxium[1]

[1] Galileo (in the opening of his first lecture on the new star in 1604) "showed *from the absence of parallax*, that the new star could not be, as the vulgar hypothesis

supra lunam collocati esse probantur, sed configurationem etiam certam et constantem cum stellis fixis habuerunt, et stationes suas servarunt, neque errones fuerunt; quales ætas nostra non semel vidit, primo in Cassiopea[1], iterum non ita pridem in Ophiucho. Quod vero hujusmodi constantia quæ conspicitur in cometis fiat ob sequacitatem ad aliquod astrum, (quæ Aristotelis opinio fuit, qui similem rationem esse posuit cometæ ad astrum unicum et galaxiæ ad astra congregata, utrumque falso), id jam olim explosum est, non sine nota ingenii Aristotelis, qui levi contemplatione hujusmodi res confingere ausus est.[2] Neque vero ista mutatio in cœlestibus circa stellas novas, locum tenet solummodo in iis stellis quæ videntur esse naturæ evanidæ, sed etiam in iis quæ morantur. Nam et in stella illa nova Hipparchi[3], apparitionis mentio facta est apud veteres, disparitionis nequaquam.[4] Etiam conspici nuper cœpit stella nova in pectore Cygni, quæ jam per duodecim annos integros duravit[5], ætatem cometæ (qualis habetur) longo intervallo supergressa, nec adhuc diminuta aut adornans[6] fugam. Neque illud rursus proprium et perpetuum est, ut veteres stellæ mutationem prorsus non patiantur, sed tantum stellæ recentioris epiphaniæ, in quibus nil mirum si mutatio eveniat, cum ipsa generatio et origo ipsarum immemorialis non sit. Missa enim Arcadum fabula de prima epiphania lunæ, qua se jactant illi fuisse antiquiores[7], non desunt exempla in rerum memoria satis fida, cum sol per tres vices, absque incidentia eclipsis aut interpositione nubium, aëre liquido et sereno, prodiit vultu mutato per multos dies, neque tamen similiter affectus, semel luce exili, bis subfusca. Talia enim evenerunt anno DCCXC, per septendecim dies, et temporibus Justiniani

represented, a mere meteor engendered in our atmosphere and nearer the earth than the moon, but must be situated among the most remote heavenly bodies."—*Life of Galileo, L. U. K.* p. 16. — *J. S.*

[1] A new star was observed in Cassiopeia by Cornelius Gemma and Tycho Brahe in 1572; it disappeared in 1574. The star in Ophiuchus was observed by Kepler in 1604, and disappeared about the end of 1605. Compare with the argument in the text, Galileo, *Dialogi dei Sistemi.*

[2] See Aristot. Meteorol. i. 8.

[3] *Hippachi* in original. — *J. S.*

[4] See Pliny, ii. 24.

[5] This star, which is of variable magnitude, was first observed by Jansen in 1600, so that the *Descriptio Globi Intellectualis* must have been written in 1612.

[6] So in original. — *J. S.*

[7] Orta prior Lunâ (de se si creditur ipsi)
A magno tellus Arcade nomen habet. OVID, *Fasti*, i. 469.

See for a dissertation on this mythical story, Heyne, *Opusc.* ii. 332., and a communication from Professor Franz given in the fourth volume of Humboldt's *Cosmos.*

per annum dimidium[1], et post mortem Julii Cæsaris per complures dies. Atque Julianæ illius obtenebrationis manet testimonium illud insigne Virgilii:

> Ille etiam extincto miseratus Cæsare Romam,
> Cum caput obscura nitidum ferrugine texit,
> Impiaque æternam timuerunt secula noctem.[2]

Varronis vero, hominis in antiquitate peritissimi, narratio quæ invenitur apud Augustinum[3] de stella Veneris,—illam scilicet tempore Ogygis regis mutavisse colorem, magnitudinem, et figuram,—dubiæ fidei esse potuit, ni simile eventum celebri spectaculo ætate nostra MDLXXVIII recurrisset. Nam tum quoque per annum integrum novatio facta est memorabilis in stella Veneris, quæ conspiciebatur magnitudine et splendore insolitis, rubedine Martem ipsum superabat, et figuram sæpius mutabat, facta quandoque triangularis, quandoque quadrangularis, etiam rotunda, ut in ipsa massa et substantia prorsus pati videretur.[4]

[1] These phenomena are mentioned in juxtaposition by Patricius, *Pancosmia*, p 111., from whom Bacon probably derived his knowledge of them. For the darkness in 790 Patricius quotes Paul the Deacon, and for that in Justinian's time Peter Messias or Mexia, who was almost a contemporary of his own. The original authority for it is Procopius, *Bell. Vandal.* ii. 14. It is to this darkening of the sun that Bacon refers in the phrase "semel luce exili." Compare a list of seventeen examples of obscuration of the sun's light in the third volume of Humboldt's *Cosmos*. He does not mention that which took place in 790; and the obscuration in the time of Justinian is said on the authority of Abul-Faragius to have lasted 14 months. Humboldt compares it to that which took place in 1783.

[2] Virg. Georg. i. 469. See Pliny, ii. 30., and the other authorities mentioned in Heyne's Virgil ad loc.

[3] St. August. De Civit. Dei, xxi. 8.

[4] Patricius was Bacon's authority for this story. After mentioning what Augustine repeats from Varro, he goes on thus: "Quæ res ævo etiam nostro accidit anno M. D LXX. VIII. Romæque visum id est die XVI Novembris. In Germaniâ vero die Decembris XXVI. Perque totum eum annum, sub vesperam, sole nondum merso visa est magnitudine insolitâ, figurâ vero modo triangulâ, modo quadrangulâ, modo rotundâ, et splendore maximo, et rubedine majore quam sit Martis rubedo. Cursum tamen non mutavit." — *Patricius, Pancosmia*, p. 107. This is given as evidence against the Aristotelian doctrine of the immutability of the heavens; and that it is not mentioned by Galileo and the other writers who so constantly refer to the new stars in Cassiopeia and Serpentarius for similar evidence seems to show that the story has no other foundation than that Venus was then visible before sunset. The story would, if true, have been a better proof of a change in the superlunary heavens than the new stars, seeing that it could not be said that Venus was a merely sublunary meteor. So wonderful a fact ought not to have been quoted on the authority of a loose and somewhat rhetorical writer like Patricius. [We must not forget however that this is an unfinished work, not published, nor prepared, nor perhaps intended, for publication by the writer. — *J. S.*]

It is possible that Patricius's story may be connected with the phenomenon observed in China in 1578, and which is thus mentioned in Biot's extracts from the annals of the Ming dynasty. "1578. 22 Fevrier (période Wanli 6me année 1me lune jour Woutchin) il parut une étoile grande comme le soleil."

Humboldt observes that it is extraordinary that no mention was made in the 16th century by European astronomers of this phenomenon. It seems that Bacon has

Quin etiam stella illa ex veteribus quæ in coxa Caniculæ sita est, quam ipse se vidisse dicit Aristoteles comæ nonnihil habentem eamque comam, præsertim obiter intuenti, vibrantem, mutata jam videtur et comam deposuisse, cum nihil ejusmodi jam nostra ætate deprehendatur.[1] Adde etiam quod complures mutationes cœlestium, præsertim in stellis minoribus, ex neglectu observationum facile præterlabuntur, et nobis pereunt. At promptum erit sciolo alicui ista ad vapores et dispositionem medii referre: sed mutationes quæ corpus astri alicujus constanter et æquabiliter et diu obsidere deprehenduntur et una cum astro circumvolvi, omnino in astro ipso, aut saltem in æthere propinquo statui debent, non in regionibus aëris inferioribus; cujus rei etiam argumentum sumitur plane validum, quod hujusmodi mutationes raro fiunt, et longis intervallis annorum; quæ autem in aëre fiunt per interpositionem vaporum, frequentius. Quod si quis judicium faciat ex ordine cœli atque motus ipsius æquabilitate, cœlum immutabile esse; atque certitudinem illam periodorum et restitutionum sumat in æternitatis tesseram non dubiam, cum substantiæ corruptibili vix competere videatur motus constantia; is paulo attentius dispicere debuerat, istam reditionem rerum per vices et tanquam in orbem per tempora certa, etiam hic infra apud nos reperiri in nonnullis; maxime in æstu oceani: differentiæ autem minores quæ in cœlestibus esse possunt, et periodis et restitutionibus suis aspectum nostrum et computationes nostras fugiunt. Neque magis motus ille circularis cœli in argumentum æternitatis sumi potest; quod scilicet lationis circularis non sit terminus[2]; motus autem immortalis substantiæ immortali convenit. Nam etiam cometæ inferiores subter lunam locati rotant, idque ex vi propria; nisi quis forte credere malit commentum illud de alligatione ad astrum. Enimvero si placeat argumentari de æternitate cœlestium ex motu circulari, id ad universitatem cœli trahi debuit, non ad partes cœli; etenim aër, mare, terra, massis æterna, partibus caduca. Quin potius contra, non ita bene ominari licet de æternitate cœli ex motu illo rotationis; quia ille ipse motus non est perfectus in cœlo, nec restituit se exacte in circulo integro et puro, sed cum declina-

mistaken Patricius's expression "totum eum annum;" which appears to mean, not hat the phenomenon lasted a year, but that it was visible to the end of the year in which it appeared. See *Connaissances des Temps* for 1846.

[1] Aristot. Meteorol. i. 6.

[2] Arist. De Cœlo, i. 9.

tionibus, sinuationibus, et spiris. Porro si quis illud quod diximus de terra retorqueat (videlicet quod mutationes quæ in ea fiunt per accidens fieri disseruimus, eo quod terra patiatur a cœlo), atque asserat contrariam esse rationem cœli, cum cœlum nullo modo pati possit vicissim a terra, quandoquidem omnis emissio a terra citra cœlum desinat, ut probabile sit cœlum, ultra omnem vim inimicam sepositum, susceptivum esse æternitatis, cum a natura opposita minime concutiatur aut labefactetur; is non contemnenda quædam objicit. Neque enim ii sumus, qui Thaletis simplicitatem revereamur, qui ignes cœlestes depascere vapores e terra et oceano sublimatos, atque inde ali et refici opinatus est[1]; (illi vero vapores recidunt fere simili quanto ac adscenderunt, neque reficiendis et terræ et globis cœlestibus ullo modo sufficiunt, neque prorsus in tam altum pervenire possint); sed tamen utcunque terræ effluvia materiata longe infra cœlum se sistant, nihilominus si terra sit primum frigidum ex sententia Parmenidis et Telesii, non facile quis affirmet aut certo ad quam altitudinem vis illa adversatrix et rivalis cœli se insinuet seriatim et per successionem, præsertim cum tenuia naturam et impressionem frigidi et calidi imbibant et longe perferant. Sed tamen, dato quod cœlum non patiatur a terra, nil obstat quin cœlestia a se invicem pati possint et immutari, sol nimirum a stellis, stellæ a sole, planetæ ab utrisque, universæ ab æthere circumfuso, præsertim in desinentiis globorum. Præterea videtur opinio de æternitate cœli magnas vires sumpsisse ex ipsa machina et constructione cœli, quam astronomi plurima cum satagentia introduxerunt. Cautum enim magnopere videtur ex ea ut cœlestia nil patiantur præter simplicem rotationem, in cæteris consistant nec perturbentur. Itaque corpora astrorum in orbibus suis tanquam clavis fixa posuerunt. Singulis autem declinationibus, sublationibus, depressionibus, sinuationibus ipsorum tot circulos perfectos convenientis crassitudinis attribuerunt, circulorum eorum et concava et convexa egregie tornantes et polientes, ut in eis nil eminens, nil asperum inveniatur, sed alter inter alterum receptus et ob lævorem exacte contiguus et tamen labi facilis, moveat placide et feliciter; quæ immortalis scilicet ingeniatio summovet omnem violentiam et perturbationem, individuas profecto corruptionis prænuntias. Nam certe si corpora tanta qualia sunt

[1] Plutarch, De Placit. Philosoph. i. 3.

globi astrorum, æthera secant; neque tamen perpetuo meant per easdem ætheris partes, sed per partes et tractus longe diversos, cum aliquando superna invadant, aliquando versus terram descendant, aliquando vertant se ad austrum, aliquando ad boream; periculum est proculdubio ne fiant plurimæ in cœlo impressiones et concussiones et reciprocationes et fluctus, atque inde sequantur condensationes et rarefactiones corporum, quæ generationibus et alterationibus viam præstinent et præstruant. Quandoquidem vero ex rationibus physicis, atque insuper ex phænomenis ipsis, plane constabit hoc posterius verum esse, atque commenta illa priora astronomorum de quibus diximus (si quis sanam mentem sumat) naturæ prorsus illudere videantur, et rerum reperiantur inania; consentaneum est, ut etiam opinio de æternitate cœlestium, quæ cum illis conjuncta est, idem subeat judicium. Quod si quis hic religionem opponat, illi responsum volumus, ethnicam jactantiam tantummodo istam æternitatem cœlo soli attribuere, Scripturas Sacras æternitatem terræ et cœlo ex æquo.[1] Neque enim legitur solum, *Solem et Lunam æternos et fideles testes in cœlo esse*[2]; sed et illud, *generationes advenire et migrare, Terram autem in æternum manere.* De natura autem labili et caduca utriusque, uno simul oraculo conclusum est: *Cœlum et Terram pertransire; verbum autem Domini non pertransire.*[3] Deinde si quis adhuc instet, negari tamen non posse quin in ipsa superficie orbis terrarum et partibus proximis infinitæ fiant mutationes, in cœlo non item; huic ita occurrimus; nec nos hæc per omnia æquare, et tamen si regiones (quas vocant) superiorem et mediam aëris pro superficie aut interiore tunica cœli accipiamus, quemadmodum spatium istud apud nos, quo animalia, plantæ, et mineralia continentur, pro superficie vel exteriore tunica terræ accipimus; et ibi quoque varias et multiformes generationes inveniri. Itaque tumultus fere omnis et conflictus et perturbatio in confiniis tantum cœli et terræ locum habere videtur; ut in rebus

[1] Lansberg makes a curious remark as to the difficulties which may arise from a literal interpretation of Scripture. "You may so interpret it," he says, "as to make it interfere not only with astronomy but with geometry; as when it is said that one of the ewers in the Temple was ten cubits across and thirty cubits round." Campanella, in his *Apologia pro Galilæo*, tells a story of one Ulysses Albergettus, who wishing to show that the moon shines by her own light, quoted the text 'Luna non dabit lumen *suum*'—"faciens vim in Iy suum."—*Iy*, it may be well to remark, is used by the schoolmen as τὸ in Greek; probably because transcribers were often ignorant of Greek, and copying by eye changed the form of what they did not understand.

[2] "manere," Ecclesiastes, i. 4.

[3] Matth. xxiv. 35.

civilibus fit, in quibus illud frequenter usu venit, ut duorum regnorum fines continuis incursionibus et violentiis infestentur, dum interiores utriusque regni provinciæ diutina pace fruuntur, et bellis tantum gravioribus et rarioribus commoventur. Quod vero ad illam alteram partem heterogeneæ cœlestium attinet (prout asseritur ab Aristotele), quod calida non sint[1], ne forte sequatur conflagratio Heraclíti, sed quod calefaciant per accidens, conterendo et diverberando aërem; nescimus quid sibi velit hujusmodi desertor experientiæ, idque contra consensum veterum. Sed in illo minime novum est, ut unum aliquid ab experientia abripiat, et statim naturæ insultet, pusillanimus simul et audax. Verum de hoc mox dicemus in quæstione, *utrum astra sint veri ignes?* fusius vero et accuratius in consiliis nostris circa Historiam Virtutum, ubi origines et cunabula Calidi et Frigidi tractabimus, mortalibus adhuc incognita et intacta. Atque quæstio de heterogenea cœlestium ad hunc modum proposita sit. Damnare enim sententiam Aristotelis absque comperendinatione res fortasse postulat, sed nostrum non patitur institutum.

Altera proponitur quæstio, *Quale sit contentum spatiorum interstellarium?* Illa enim aut vacua sunt, quod Gilbertus sensit; aut repleta corpore quod sit ad astra instar aëris ad flammam, quod familiariter accedit ad sensum; vel repleta corpore homogeneo cum ipsis astris, lucido et quodammodo empyreo, sed secundum minus, lucis scilicet non tam præfulgidæ et vibrantis: id quod sibi velle videtur recepta opinio, quod stella sit pars densior sphæræ suæ.[2] Nihil autem officit quo minus lucidum sit diaphanum ad transmittendam lucem magis fortem. Nam acute notavit Telesius etiam aërem communem continere aliquid in se lucis, eo usus argumento, quod sint quædam animalia, quæ noctu vident, quorum scilicet visus ad tenuem hujusmodi lucem recipiendam et fovendam sit proportionatus.[3] Nam actum lucis absque ulla luce, vel ex ipsa spiritus visivi luce interna fieri, minus credibile esse. Sed et flamma ipsa diaphana conspicitur, etiam ad transmittendam speciem corporis opaci, ut in filis lucernarum patet; multo magis ad transmittendam speciem lucis intensioris. Etiam ex flammis aliæ

[1] They are the cause of heat by their motion and the consequent friction of the air, but are not themselves hot. Aristot. de Cœlo, ii. 7.

[2] Aristot. ubi suprà.

[3] Telesius, De Rer. Nat. i. 3.

aliis sunt pellucidiores. Idque accidit vel ex natura corporis inflammati, vel ex copia. Nam flamma sevi aut ceræ magis luminosa est, et (si ita loqui licet) magis ignea; at flamma spiritus vini magis opaca, et tanquam aërea, præsertim si in parva sit quantitate, ut flamma seipsam non inspisset. At nos hujus rei etiam experimentum fecimus; videlicet accipientes candelam ceream, eamque in situla erigentes (situla idcirco usi metallica, ut corpus candelæ a flamma quæ circumfundenda erat posset muniri), situlam vero in patera ubi erat parum spiritus vini collocantes, tumque primo candelam, deinde spiritum vini accendentes; ubi facile erat cernere flammam candelæ coruscantem et candidam, per medium flammæ spiritus vini infirmæ et vergentis ad diaphanum.[1] Atque pari ratione cernuntur sæpius per cœlum trabes lucidæ lucem manifestam ex se præbentes, et tenebras noctis insigniter illustrantes; per quarum corpora tamen datur conspicere astra. Attamen ista inæqualitas stellæ et ætheris interstellaris non bene definitur per tenue et densum, ut stella scilicet sit densior, æther tenuior. Nam generaliter hic apud nos flamma aëre est corpus subtilius, magis, inquam, expansum, et minus habens materiæ pro spatio quod occupat; quod etiam in cœlestibus obtinere probabile est. Durior vero est error, si stellam sphæræ partem esse intelligant veluti clavo fixam, et æthera stellæ deferens.[2] Hoc enim fictitium quiddam est, quemadmodum et orbium contiguatio illa quæ describitur. Nam corpus stellæ in cursu suo aut æthera secat, aut et æther ipse rotat simul æqualiter. Si enim inæqualiter rotet, etiam stellam secare æthera necesse est. Fabrica autem illa orbium contiguorum, ut concavum exterioris orbis recipiat convexum interioris, et tamen propter lævorem utriusque alter alterum in conversionibus suis, licet inæqualibus, non impediat, realis non est; cum perpetuum et continuum sit corpus ætheris, quemadmodum et aëris; et tamen quia magna reperiatur in utroque corpore diversitas, quatenus ad raritatem et alia, regiones ipsorum docendi gratia rectissime distinguantur.

[1] Compare *Sylva Sylvarum* (31.).

[2] The phrase fixed stars, Sidera infixa cœlo, was originally connected with the notion of the stars being fastened to the vault of heaven. The substitution, as Humboldt has remarked, of *fixa* for *infixa* or *affixa*, indicates the transition to our notion of fixed stars, which relates only to their relative immobility. See *Cosmos*, vol. iii., chapter on Fixed Stars. There is a curious passage in Acosta's History of the Indies on this subject. He conceives that both the Milky Way and what are commonly called the Coal Bags belong to the substance of the heaven itself, and prove by their motion that the heavens turn as well as the stars [i. 2.].

Itaque recipiatur sexta[1] quæstio secundum hanc nostram explicationem. Sequitur quæstio altera nec ea simplex; de substantia ipsorum astrorum. Primo enim quæritur, *An sint alii globi sive massæ ex materia solida et compacta, præter ipsam terram?* Sana enim mente proponitur ea contemplatio in libro de facie in orbe lunæ, non esse verisimile, in dispersione materiæ naturam quicquid compacti corporis erat in unicum terræ globum conclusisse, cum tantus sit exercitus globorum ex materia rara et explicata.[2] Huic vero cogitationi tam immoderate indulsit Gilbertus (in quo tamen habuit præcursores vel duces potius nonnullos ex antiquis), ut non solum terram et lunam, sed complures alios globos, solidos et opacos, per expansionem cœli inter globos lucentes sparsos asserat.[3] Neque opinio ejus hic stetit, sed et globos illos lucentes ad aspectum, nimirum solem et clarissima quæque astra, ex materia quapiam solida, licet magis splendida et æquali, constitui existimavit; lucem primitivam cum lumine, quod ejus censetur imago, confundens (nam et nostrum mare ex sese lucem ad distans proportionatum ejaculari censuit); nullam autem conglobationem agnovit Gilbertus, nisi in materia solida, cujus corpora illa circumfusa rara et tenuia, effluvia quædam tantum essent et tanquam defectiones; et deinde vacuum. Verum diligentissimi cujusque et maxime sobrii investigatoris naturæ animum perstringere posset cogitatio illa de Luna, quod sit ex materia solida. Nam et lucem reverberat, nec lucem transmittit, et propriæ lucis tanquam expers est, et plena est inæqualitatis; quæ omnia solidorum sunt. Videmus enim æthera ipsum et aërem, quæ tenuia sunt corpora, solis lucem excipere, sed minime reflectere; quod luna facit. Solis vero radiorum is est vigor, ut densas admodum nubes, quæ materiæ sunt aqueæ, trajicere

[1] This is apparently a wrong reading for *ista*. The phrase "ista quæstio recipiatur" occurs with variations several times in the course of the tract. That the text is wrong appears not only from the circumstance that the question Bacon is speaking of is the seventh and not the sixth, but from this also, that he clearly does not intend to say "Let a sixth question be admitted," but "Let the question of which I have been speaking be admitted;" a reference which requires the demonstrative pronoun.

[2] Plutarch, De Facie in Orbe Lunæ, p. 924.

[3] "Duo sunt globorum genera, lucentia et non lucentia; lucentia Sol, fixæ splendidiores; non lucentia, ut tellus, Luna, stellæ nebulosæ."—*Gilbert, Physiol. Nov.* ii. 10.

Thales is said to have been the first person who asserted that the moon is illuminated by the sun. Ocellus, and perhaps Heraclides, said that she consists of earth surrounded by a mist. Diogenes Apolloniates, probably following Anaxagoras, affirmed that along with the visible stars revolve in the heavens ἀφανεῖς λίθοι, which occasionally fall to the earth. Stobæus, Eclog. Phys. i. 25.

et penetrare possit; lunam tamen neutiquam. At lux lunæ ipsius in eclipsibus aliquibus cernitur nonnulla, licet obscura; in noviluniis autem et ætatibus lunæ, nulla, præter partem irradiatam a sole. Porro, flammæ impuræ et fæculentæ (ex quo genere substantiæ Empedocles constare lunam opinatus est[1]) sunt certe inæquales, sed tamen eæ inæqualitates non locantur, sed mobiles plerunque sunt; cum maculæ in luna constantes putentur. Accedit quoque quod maculæ illæ etiam suas subinæqualitates habere deprehendantur per specilla optica, ut jam plane multipliciter figurata reperiatur luna, et selenographia illa sive typus lunæ, quem animo agitabat Gilbertus[2], jam ex Galilæi et aliorum industria præsto esse videatur. Quod si luna ex materia quapiam solida constitui possit ut terræ affinis, aut fæx cœli (hujusmodi quædam jactantur), videndum rursus an illa sit in hoc genere sola. Nam et Mercurius quandoque repertus est in conjunctione solis, tanquam macula quædam, sive pusilla eclipsis. At maculæ illæ nigricantes quæ in hemisphærio antarctico inveniuntur, suntque fixæ, non secus ac galaxia, majorem injiciunt dubitationem de globis opacis etiam in partibus cœli sublimioribus.[3] Nam quod illud in causa sit, quia cœlum in illis locis sit tenue et tanquam perforatum, id minus verisimile est; propterea quod hujusmodi decrementum et tanquam privatio rei visibilis ex tanta distantia visum nostrum nullo modo percutere possit, cum etiam reliquum corpus ætheris invisibile sit, nec nisi per comparationem ad corpora stellarum cernatur. Illud fortasse magis probabile foret, nigrores illos [defectui][4] luminis imputare, quia rariores inveniuntur stellæ circa eam partem cœli, quemadmodum circa galaxiam crebriores; ut alter locus continenter luminosus videatur, alter umbrosus. Magis enim committi videntur ignes cœlestes in antarctico hemisphærio, quam in nostro; majores siquidem stellas habeat, sed pauciores, et spatia interstellaria majora. Verum ipsa traditio de maculis illis non admodum fida est, saltem non tam magna circa eam observationem adhibita est diligentia, ut consequentiæ inde deduci adhuc debeant. Illud

[1] Empedocles said that the moon was *ἀέρα συνεστραμμένον νεφοειδῆ, πεπηγότα ὑπὸ πυρὸς ὥστε σίμμικτον, δισκοειδῆ δὲ τῷ σχήματι.* — *Stobæus, Eclog. Physic.* i. 27.

Heeren remarks that Stobæus is the only author by whom this opinion is mentioned.

[2] See his Physiologia Nova, ii. 14., and the map of the moon by which it is illustrated.

[3] See for this Patricius, f. 90.; and Acosta's History of the Indies, book i. chap. 2.

[4] This word was supplied in Montagu's edition. — *J. S.*

magis premit inquisitionem præsentem, quod possint esse plures globi opaci per æthera sparsi, qui omnino non cernuntur. Nam et luna ipsa in primis ortibus, quatenus illustratur a sole, visum sane ferit, cornu et labro illo tenui circuli extimi, in profundo autem minime, sed cernitur eadem specie tanquam reliquus æther: et stellulæ illæ erraticæ circa Jovem a Galilæo (si fides constet) repertæ, merguntur ad visum nostrum in pelago illo ætheris, tanquam insulæ minores et non conspicuæ; similiter et illæ stellulæ quarum glomeratio effecit galaxiam, si singulæ sparsim, non congregatæ confertim, collocatæ essent, prorsus conspectum nostrum effugerent; quemadmodum et complures aliæ, quæ noctibus serenis, præsertim per hiemem, micant; etiam nebulosæ illæ stellæ sive foramina ad Præsepe [1], jam distinctæ per specilla numerantur; quin per eadem specilla in fonte lucis omnium purissimo (solem dicimus), macularum et opaci et inæqualitatis scrupulus nonnullus objectus esse videtur. Quod si nihil aliud, certe gradatio ipsa inter astra cœlestia quoad lucem, a clarissimis descendens et pertingens ad obscura et caliginosa, eo rem deducit, ut fidem faciat posse esse et globos omnino opacos. Minor enim gradus esse videtur a stella nebulosa ad opacam, quam a stella clarissima ad nebulosam. Aspectus autem noster plane fallitur et circumscribitur. Quicquid enim spargitur in cœlo, neque habet magnitudinem insignem atque etiam lucem vividam et fortem, latet, nec faciem cœli mutat. Neque vero imperiti cujusquam animum percellat, si in dubium veniat utrum globi ex materia compacta pensiles sisti possint. Nam et terra ipsa in medio aëris, rei mollissimæ, circumfusi, pensilis natat; et magnæ nubium aquosarum moles, et grandinis congeries, hærent in regionibus aëris, et inde magis

[1] The nebula Præsepe in Cancer, and the one in the head of Orion, were the two first nebulæ ever resolved into distinct stars. Galileo gave figures of them as they appeared through his telescope in the *Sydereus Nuncius*. What Bacon goes on to say of spots in the sun is particularly interesting. Galileo did not publish on the subject before 1613; so that Bacon's information was probably not derived from Galileo, though it is believed that Galileo's first observations were made in November 1610. The earliest account which is known to have been printed of these spots is that of Fabricius, whose father's interesting correspondence with Kepler has recently been published. His tract *De Maculis in Sole observatis* was published at Wittenberg, 1611. It seems difficult to decide the question of priority of observation between him and Galileo. Harriot observed the spots in December 1610, but did not apparently know what to make of the appearance, and does not designate the phenomena by the specific name of spots until December 1611, before which time their existence had been fully ascertained by others. He drew a picture however of what he had seen on the first occasion, of which a facsimile has been published by Professor Rigaud, to whom I am indebted for most of the substance of this note. See his Supplement to Bradley's Works, pp. 32. 35. 37.

dejiciuntur quam descendunt, antequam terræ vicinitatem persentiscant. Itaque optime notavit Gilbertus, corpora gravia post longam a terra distantiam motum versus inferiora paulatim exuere, utpote qui a nullo alio corporum appetitu quam illo coëundi et se congregandi ad terram (quæ est corporum cum iisdem connaturalium massa) ortum habet, atque intra orbem virtutis suæ terminatur.[1] Nam quod de motu ad terræ centrum asseritur, esset profecto virtuosum genus nihili, quod tanta ad se raperet; neque corpus nisi a corpore patitur. Itaque quæstio ista de globis opacis et solidis, licet nova et ad opiniones vulgares durior, recipiatur; atque una conjungatur quæstio illa vetus, nec tamen decisa, *quæ ex astris lucem promant primitivam, atque ex sese, et quæ rursus ex illustratione solis,* quarum altera consubstantialia videntur soli, altera lunæ. Denique omnem inquisitionem de diversitate substantiæ astrorum ad invicem, quæ multifaria videtur, cum alia rutila, alia plumbea, alia candida, alia splendida, alia nebulosa manifesto et constanter cernantur, ad septimam quæstionem intelligimus referri. Altera quæstio ea est, *An astra sint veri ignes?* quæ tamen quæstio desiderat prudentiam quandam intelligendi. Aliud est enim dicere, *astra esse veros ignes;* aliud, *astra* (*sint licet veri ignes*) *cunctas exercere vires, atque easdem edere actiones, quas ignis communis.* Neque propterea ad ignem aliquem notionalem aut phantasticum deveniendum est, qui nomen ignis retineat, proprietates abneget. Nam et noster ignis, si in tali quanto quale est quantum astri in æthere collocaretur, differentes daturus fuerit operationes ab iis quæ reperiuntur hic apud nos; cum entia longe diversas nanciscantur virtutes, et ex quanto suo et ex consitu sive collocatione sua. Etenim massæ majores, hoc est corpora connaturalia quæ congregantur in tali quanto quod habeat analogiam ad summam universi, induunt virtutes cosmicas, quæ in portionibus suis nullatenus reperiuntur. Nam oceanus, qui est aquarum congregatio maxima, fluit et refluit; at stagna et lacus minime. Similiter universa terra pendet, portio terræ cadit. Collocatio autem entis plurimi ad omnia momenti est et in portionibus majoribus et minoribus, propter contigua et adjacentia, vel amica vel inimica. At multo majorem etiam evenire necesse est actionum diversitatem inter ignem astrorum et nostrum, quia non tantum in quanto et col-

[1] Gilbert, Physiol. Nova, i. 21.

locatione, sed etiam in substantia, aliquatenus varietur. Ignis enim astrorum purus, integer, et nativus; at ignis noster degener, qui tanquam Vulcanus in terram dejectus ex casu claudicat. Si quis enim advertat, habemus ignem apud nos extra locum suum, trepidum, contrariis circumfusum, indigum, et stipem alimenti ut conservetur emendicantem, et fugientem. At in cœlo existit ignis vere locatus, ab impetu alicujus contrarii disjunctus, constans ex se et similibus conservatus, et proprias operationes libere et absque molestia peragens. Itaque nihil opus fuit Patritio, ut formam flammæ pyramidalem, qualis apud nos invenitur, salvaret, comminisci superiorem partem astri, quæ versus æthera vertitur, posse esse pyramidalem, licet inferior pars, quæ a nobis conspicitur, sit globosa.[1] Nam pyramis illa flammæ per accidens est ex coactione et constrictione aëris, siquidem flamma circa fomitem suum plenior, ab inimicitia aëris sensim constringitur et effingitur in formam pyramidis. Itaque in flamma, basis flammæ lata est, vertex acutus; in fumo, contra, inferius acutum, vertex latus, et tanquam pyramis inversa; quia aër fumum recipit, flammam comprimit. Quare consentaneum est flammam apud nos esse pyramidalem, in cœlo globosam. Similiter et flamma apud nos corpus momentaneum est, in æthere permanens et durabilis. Attamen et apud nos flamma et ipsa manere possit in forma sua et subsistere, nisi a circumfusis perderetur; quod manifestissimum est in flammis majoribus. Omnis enim portio flammæ in medio flammæ sita, et flamma undique circumdata, non perit, sed eadem numero manet inextincta, et cœlum rapide petens; at in lateribus laboratur atque abinde orditur extinctio. Cujus rei modus (flammæ interioris scilicet permanentia in figura globosa, et flammæ exterioris vanescentia et pyramis) in flammis bicoloribus experimento demonstrari possit. Quinetiam de ipso ardore flammæ inter cœlestem et nostram plurimum variari potest. Nam flamma cœlestis libenter et placide explicatur, tanquam in suo, at nostra tanquam in alieno compingitur et ardet et furit. Omnis etiam ignis constipatus et incarceratus fit ardentior. Enimvero et radii flammæ cœlestis postquam ad corpora densiora et magis obstinata pervenerint, et ipsi lenitatem suam deponunt, et fiunt magis adurentes. Itaque non

[1] "Astra flammæ si sunt, etsi non rotundæ sint etiamsi sursum tendant, nihil obstat quin exemplo nostrarum, procul aliquanto spectatæ, et rotundæ appareant et radiatæ." —*Patricius, Pancosmia*, xv.

debuit Aristoteles conflagrationem Heracliti orbi suo metuere, licet astra veros ignes statuisset. Poterit igitur ista quæstio recipi secundum hanc explicationem. Sequitur altera quæstio, *An astra alantur*, atque etiam *an augeantur, minuantur, generentur, extinguantur?* Atque certe ex veteribus aliquis observatione quadam plebeia ali astra putavit, instar ignis, atque aquas et oceanum et humiditatem terræ depascere atque ex vaporibus et halitibus reparari. Quæ certe opinio non videtur digna esse, ut quæstioni materiam subministret. Nam et vapores hujusmodi longe citra astrorum altitudines deficiunt; neque illorum tanta est copia, ut et aquis et terræ per pluvias et rores reparandis, atque insuper tot et tantis globis cœlestibus reficiendis sufficere ullo modo queant; præsertim cum manifestum sit terram et oceanum humore evidenter per multa jam secula non decrescere, ut tantundem reponi videatur, quantum exsorbetur. Neque etiam ratio alimenti astris tanquam igni nostro competit. Ubi enim aliquid deperit et decedit, ibi etiam reponitur quippiam et assimilatur.[1] Quod genus assimilationis ex Tartarismis est, et ex contrariorum aut dissimilium circumfusione ortum ducit. At in astrorum mole similari et interiore nil tale evenit, non magis quam in visceribus terræ, quæ nec ipsa aluntur, sed substantiam suam servant secundum identitatem, non secundum assimilationem. Attamen de extimis oris corporum sidereorum recte datur quæstio, *Utrum ea uno eodemque tenore maneant, aut æthera circumfusum deprædentur, atque etiam inficiant?* Quare eo sensu de alimoniis astrorum etiam quæri poterit. De augmentis vero et diminutionibus astrorum in toto suo, recte adjungitur quæstio; licet rara admodum fuerint phænomena, quæ illi dubitationi occasionem præbere possint. Primo enim exemplum nullum, neque simile aliquid inter ea quæ apud nos reperiuntur, huic quæstioni patrocinatur[2]; cum globus noster terræ et aquarum non videatur suscipere, secundum totum suum, augmentationem aut diminutionem evidentem aut insignem; sed molem suam et quantum suum servare. At stellæ apparent ad aspectum nostrum interdum majore, interdum minore corpore. Verum est; sed illa majoritas et minoritas stellæ vel ad longinquitatem et ad vicinitatem refertur, ut in apogæis et perigæis planetarum, vel ad

[1] *assimulatur* in the original; so also in the next sentences *assimulationis* and *assimulationem*. — *J. S.*

[2] *patrocinantur* in the original. — *J. S.*

constitutionem medii. Quæ vero fit ex constitutione medii facile dignoscitur, quod non alicui certæ stellæ, sed omnibus ex æquo apparentiam mutet, ut fit noctibus hiemalibus, gelu intensiore, quando stellæ auctæ videntur magnitudine, quia vapores et parcius surgunt et fortius exprimuntur, et universum corpus aëris nonnihil condensatur, et vergit ad aqueum sive crystallinum, quod species exhibet majores. Quod si forte fuerit aliqua particularis interpositio vaporum inter aspectum nostrum et astrum certum, quæ speciem astri ampliet (quod in sole et luna frequenter et manifesto fit, et in reliquis accidere potest), ea apparentia nec ipsa fallere potest, quia mutatio illa magnitudinis non durat, neque sequitur astrum nec cum corpore ejus movetur, verum astrum ab ea cito liberatur, et solitam recuperat speciem. Veruntamen quamvis ista ita se habeant, tamen cum et olim temporibus priscis atque etiam ætate nostra, celebri et magno spectaculo, magna novatio facta fuerit in stella Veneris et magnitudine et colore, atque etiam figura; cumque mutatio quæ astrum aliquod certum perpetuo et constanter sequitur, et cum corpore ejus circumvolvi cernitur, necessario statui debeat in astro ipso, et non in medio; cumque ex observationum neglectu multa quæ in cœlo fiunt conspicua prætereantur et nobis pereant; istam partem quæstionis nonæ recte admitti censemus. Ejusdem generis est altera pars quæstionis, *Utrum astra per longos seculorum circuitus nascantur et dissipentur?* nisi quod major suppetat phænomenorum ubertas quæ hanc quæstionem provocat quam illam de augmentis; sed tamen in uno genere tantum. Nam quoad veteres stellas, omni seculorum memoria, nec alicujus earum ortus primus notatus est (exceptis iis quæ Arcades de Luna olim fabulati sunt), nec aliqua ex iis desideratur. Earum vero quæ cometæ habitæ sunt, sed forma et motu stellari, et prorsus veluti stellæ novæ[1], et apparitiones vi-

[1] This mode of speaking of the new stars confirms Professor Rigaud's explanation of a curious phrase in one of Sir William Lower's letters to Harriot. "His elliptical Iter planetarum, methinkes, shewes a way to the solving of the unknown walks of comets" (he is speaking of Kepler); "for as his ellipsis in the earth's motion is more a circle, and in Mars is more longe, and in some of the other planets may be longer againe, so in thos commets that appeare fixed the ellipsis may be neere a right line." The Professor remarks that he may possibly allude to phenomena like the new star of 1572. It is this letter of Sir William Lower's, the first part of which Baron Zach ascribed to the Earl of Northumberland, an error which is repeated by Apelt in his *Reformation of Astronomy*. See Rigaud's Supplement to Bradley's Works, pp. 43. 49.

The idea that the new star of 1572 moved alternately towards and from the earth in a right line, was proposed by John Dee. See Narrien's Hist. of Astronomy, p. 384.

dimus, atque etiam ab antiquis accepimus, et disparitiones, dum aliis hominibus tanquam consumptæ visæ sunt, aliis tanquam assumptæ (utpote quæ ad nos devectæ tanquam in perigæis, postea ad sublimiora remearunt), aliis vero tanquam rarescentes existimatæ sunt atque in æthera solutæ. Verum universam istam quæstionem de stellis novis ad eum locum rejicimus ubi de Cometis dicemus. Superest quæstio altera, de Galaxia videlicet, *An Galaxia sit glomeratio astrorum minimorum, aut corpus continuatum, et pars ætheris, mediæ naturæ inter ætheream et sideream?* Nam opinio illa de exhalationibus jamdiu exhalavit, non sine nota ingenii Aristotelis, qui tale aliquid confingere ausus est, rei tam constanti et fixæ imponendo naturam transitoriam et variam.[1] Quin et finis etiam hujus quæstionis, prout a nobis proponitur, adesse jam videtur, si iis credimus quæ Galilæus tradidit, qui confusam illam lucis speciem in astra numerata et locata digessit. Nam quod Galaxia non tollit aspectum astrorum quæ intra ipsam inveniuntur, illud certe litem non dirimit, nec rem inclinat in alterutram partem; id tantummodo fortasse abnegat, non collocari Galaxiam inferius æthere stellato. Hoc enim si foret, atque insuper corpus illud continuatum Galaxiæ aliquam haberet profunditatem, aspectum nostrum interceptum iri consentaneum esset. Si vero pari collocetur altitudine cum stellis quæ per eam conspiciuntur, nil obstat quin stellæ spargi possint in ipsa Galaxia, non minus quam in reliquo æthere. Itaque et istam quæstionem recipimus. Atque hæ sex quæstiones pertinent ad substantiam cœlestium; qualis scilicet sit substantia cœli in genere, et qualis ætheris interstellaris, et qualis Galaxiæ, et qualis astrorum ipsorum, sive conferantur ad invicem, sive ad ignem nostrum, sive ad corpus proprium. At de numero, magnitudine, figura, et distantia astrorum, præter phænomena ipsa et quæstiones historicas, de quibus postea dicetur, problemata philosophica fere simplicia sunt. De numero scilicet sequitur quæstio altera. *An is sit numerus astrorum qui videtur, quique Hipparchi diligentia notatus et descriptus est, et in globi cœlestis modulum conclusus?*[2] Nam et satis frigida est ratio ea quæ redditur innumeræ illius multitudinis stellarum occultarum et tanquam invisibilium, quæ noctibus serenis præsertim per hiemem conspici solet; ut illæ apparentiæ scilicet sint non stellæ minores, sed radiationes tan-

[1] Arist. Meteor. i. 8.

[2] Namely, a thousand and twenty-two.

tum et micationes et tanquam spicula stellarum cognitarum; et nova jam censa sunt plebeculæ cœlestis capita a Galilæo, non solum in illa turma quæ Galaxiæ nomine insignitur, verum etiam inter stationes ipsas et ordines planetarum. Stellæ autem invisibiles fiunt, aut propter corporis parvitatem, aut propter opacitatem (nam tenuitatis nomen non admodum approbamus, cum flamma pura sit corpus eximiæ tenuitatis), aut propter elongationem et distantiam. De auctario autem numeri astrorum per generationem stellarum novarum, quæstionem, ut prius, ad locum de Cometis rejicimus. Quod vero ad magnitudinem astrorum attinet, ea quæ est secundum apparentiam magnitudo pertinet ad phænomena, vera autem ad inquisitionem philosophicam, solo illo contenta problemate duodecimo[1]: *Quæ sit vera magnitudo cujusque astri, vel mensurata, vel saltem collata?* facilius enim est inventu et demonstratu, globum lunæ esse globo terræ minorem, quam globum lunæ in ambitu tot millia passuum continere. Itaque tentandum et contendendum ut exactæ magnitudines inveniantur; illæ si minus haberi possint, utendum comparatis. Capiuntur autem atque concluduntur magnitudines veræ, vel ab eclipsibus et umbris, vel ab extensionibus tam luminis quam aliarum virtutum quas corpora quæque pro ratione magnitudinis longius aut propius ejaculantur et diffundunt; vel postremo per symmetriam universi, quæ portiones corporum connaturalium ex necessitate quadam temperat et terminat. Minime vero standum iis quæ ab astronomis de veris magnitudinibus astrorum tradita sunt (licet videatur esse res magnæ et accuratæ subtilitatis) satis licenter et incaute; sed exquirendæ (si quæ se ostendunt) probationes magis fidæ et sinceræ. Magnitudo vero et distantia astrorum se invicem indicant ex rationibus opticis; quæ tamen et ipsæ excuti debent. Ista autem de vera magnitudine astrorum quæstio numero duodecima est. Sequitur quæstio altera de figura, *An astra sint globi?* hoc est, coacervationes materiæ in figura solida rotunda. Videntur autem ad apparentiam tres se ostendere figuræ astrorum; globosa et crinita, ut sol; globosa et angulata, ut stellæ (crines vero et anguli ad aspectum tantum referuntur, forma globosa tantum ad substantiam); globosa simpliciter, ut luna. Neque enim conspicitur stella oblonga,

[1] This problem would be the thirteenth if that which relates to the number of the stars is included in the enumeration. I am therefore inclined to think that it is not: the reason of the omission being that it is matter of direct observation.

aut triangularis, aut quadrata, aut alterius figuræ. Atque secundum naturam videtur ut massæ rerum majores, ad conservationem sui et veriorem unionem, se congregent in globos. Decima quarta quæstio pertinet ad distantiam; *Quæ sit vera distantia alicujus stellæ in profundo cœli?* Nam distantiæ planetarum tam ad invicem quam cum stellis fixis laterales sive per ambitum cœli reguntur a motibus earum. Quemadmodum autem superius de magnitudine astrorum diximus, si exacta magnitudo et plane mensurata haberi non possit, utendum esse magnitudine comparata; idem de distantiis præcipimus; ut si exacte capi distantia non possit (exempli gratia a terra ad Saturnum, vel ad Jovem), tamen ponatur in certo Saturnum esse Jove sublimiorem. Neque enim systema cœli quoad interius, scilicet ordo planetarum quoad altitudines, omnino sine controversia est, neque quæ nunc obtinuerunt, olim credita sunt. Atque etiam adhuc lis pendet de Mercurio et Venere, utra sit sublimior. Inveniuntur autem distantiæ aut ex parallaxibus, aut ex eclipsibus, aut ex rationibus motuum, aut ex apparentiis diversis magnitudinum. Etiam alia auxilia huic rei comparanda sunt, quæ humana queat industria comminisci. Præterea crassitudines sive profunditates sphærarum pertinent etiam ad distantias.

THEMA CŒLI.

Cum vero tanta reperiantur undequaque incommoda, satis habendum si asseratur quippiam quod minus durum sit. Constituemus itaque et nos *Thema Universi*, pro modo historiæ quæ nobis hactenus cognita est; omnia integra servantes judicio nostro, postquam historia et per historiam philosophia nostra inductiva magis adulta sit. Proponemus autem primo quædam de materia cœlestium, unde motus et constructio ipsorum melius intelligi possit; postea de motu ipso (quod nunc præcipue agitur) quæ cogitata et visa nobis sunt proferemus. Videtur itaque natura rerum in dispertitione materiæ, disclusisse tenuia a crassis; atque globum terræ crassis, omnia vero ab ipsa superficie terræ et aquarum ad ultima cœli usque tenuibus sive pneumaticis assignasse; tanquam geminis rerum classibus primariis, non æquis scilicet sed convenientibus portionibus. Neque vero vel aqua in nubibus hærens vel ventus in terra conclusus naturalem et propriam rerum collocationem confundit. Hæc vero differentia tenuis vel pneumatici et crassi vel tangibilis omnino primordialis est, et ea qua maxime utitur *systema universi*. Sumpta autem est ex rerum conditione omnium simplicissima, hoc est copia et paucitate materiæ pro exporrectione sua. Pneumetica vero quæ hic apud nos inveniuntur (de iis loquimur quæ simplicia et perfecta existunt, non composita et imperfecte mista) sunt plane illa duo corpora Aër et Flamma. Ea vero ut corpora plane heterogenea ponenda sunt, non ut vulgo putatur, quod flamma nil aliud sit quam aër incensus. His vero respondent in superioribus natura Ætherea et Siderea, sicut et inferioribus Aqua et Oleum, et magis in profundo Mercurius et Sulphur, et generaliter corpora cruda et pinguia, vel aliter corpora flammam exhorrentia et concipientia (sales vero compositæ naturæ sunt ex partibus crudis simul et inflammabilibus).[1] Istæ vero duæ magnæ rerum familiæ, Aërea

[1] Salt is mentioned here, because Mercury, Sulphur, and Salt are according to Paracelsus the three constituent principles of all substances. Bacon however, as we

et Flammea, videndum quo fœdere universi partem longe maximam occupaverint, et quas partes habeant in systemate. In aëre terræ proximo flamma vivit tantum vitam momentaneam, et affatim perit. Postquam autem aër cœperit esse ab effluviis terræ defæcatior et bene attenuatus, natura flammæ per varios casus tentat et experitur in aëre consistere, et quandoque acquirit durationem nonnullam, non ex successione ut apud nos, sed in identitate; quod in aliquibus cometis humilioribus ad tempus obtinet, quæ sunt mediæ fere naturæ inter flammam successivam et consistentem; non tamen figitur aut constat flammea natura, antequam perventum fuerit ad corpus lunæ. Eo loco flamma extinguibile illud deponit, et se tuetur utcunque; sed tamen infirma et sine vigore est ejusmodi flamma, et parum habens radiationis, nec propria natura vivida, nec a contraria natura admodum excitata. Etiam integra non est, sed ex compositione cum substantia ætherea (qualis ibi invenitur) maculosa et interpolata. Neque in regione Mercurii admodum feliciter collocata est flamma, cum ex coadunatione sua parvum tantummodo planetam conficere potis sit, eumque cum magna et perturbata varietate et fluctu motuum, tanquam ignem fatuum, laborantem et conflictantem, nec se a solis præsidiis nisi per parva spatia disjungi sustinentem. Atque postquam ad regionem Veneris est ventum, incipit roborari flammea natura et clarescere, et in globum bene amplum congregari; qui tamen et ipse famulatur soli, et longius ab eo recedere exhorret. In Solis autem regione tanquam in solio collocatur flamma; media inter flammas planetarum, fortior etiam et vibrantior quam flammæ fixarum, propter majorem antiperistasin et intensissimam unionem. At flamma in regione Martis etiam robusta cernitur, solis vicinitatem rutilatione referens, sed jam sui juris, et quæ per integrum cœli diametrum se a sole disjungi patiatur. In regione autem Jovis flamma contentionem paulatim deponens, magis placida videtur et candida, non tam ex natura propria (ut stella Veneris, quippe ardentior), sed ex natura circumfusa minus irritata et exasperata; in qua regione verisimile est, illud quod reperit Galilæus, cœlum incipere stellescere, licet

see in the *Historia Sulphuris, Mercurii et Salis*, of which only the aditus or preface has been preserved, refuses to recognise salt as a co-ordinate principle with the other two, "duo ex illis, Sulphurem scilicet et Mercurium (sensu nostro accepta) censemus esse naturas admodum primordiales et penitissimos materiæ schematismos. . . . Quod vero ad Salem attinet, alia res est."

per stellas parvitate sua invisibiles.[1] In Saturni autem regione rursus natura flammæ[2] videtur nonnihil languescere et hebescere; utpote et a solis auxiliis longius remota, et a cœlo stellato in proximo exhausta. Postremo flammea et siderea natura, æthereæ naturæ victrix, cœlum dat stellatum, ex natura ætherea et siderea (quemadmodum globus terræ ex continenti et aquis) varie sparsis conflatum, versa tamen et subacta atque adeo assimulata[3] substantia ætherea, ut sidereæ sit prorsus patiens et subserviens. Itaque tres reperiuntur a terra ad fastigia cœli regiones generales, et tria tanquam tabulata, quoad naturam flammeam. Regio extinctionis flammæ; regio coadunationis flammæ; et regio dispersionis flammæ. Atque de contiguo et continuo argutari in corporibus mollibus et fluoribus, plebeium omnino foret. Illud tamen intelligendum, consuesse naturam ad spatia quædam per gradus, deinde subito per saltus procedere, atque hujusmodi processum alternare; aliter nulla posset fieri fabrica, si per gradus insensibiles perpetuo procederetur. Quantus enim saltus (quoad explicationem materiæ) a terra et aqua ad aërem vel maxime crassum et nebulosum? Atque hæc tamen natura tam distantia corpora loco et superficie conjunguntur, sine medio aut intervallo. Nec minor saltus (quoad naturam substantialem) a regione aëris ad regionem lunæ: ingens similiter a cœlo lunæ ad cœlum stellatum. Itaque si quis continuum et contiguum acceperit non ex modo nexus, sed ex diversitate corporum connexorum, tres illæ[4] quas diximus regiones in limitibus suis pro contiguis tantum haberi queant. Jam vero videndum liquido et perspicue, hæc nostra de substantiis systematis theoria, quæ et qualia neget, et quæ et qualia affirmet, ut facilius teneri vel destrui possit. Negat illud vulgatum, *flammam esse aërem incensum;* affirmando corpora illa duo Aërem et Flammam plane esse heterogenea, instar Aquæ et Olei, Sulphuris et Mercurii. Negat *vacuum illud coacervatum Gilberti inter globos sparsos,* sed spatia vel aërea vel flammea natura repleri. Negat *lunam esse corpus aqueum vel densum vel solidum,* sed ex natura flammea licet lenta et enervi, primum scilicet rudimentum et

[1] [*invisiles* in the original: a form of the word not recognised by Facciolati, but common, I believe, in Telesius.—*J. S.*] This reference to Jupiter's satellites shows that the *Thema Cœli* was written after the publication of the *Sydereus Nuncius.*

[2] So in the original: the true reading is probably *flammea.* — *J. S.*

[3] So in the original: a mistake I suppose for *assimilata.* — *J. S.*

[4] *illas* in the original. — *J. S.*

sedimentum ultimum flammæ cœlestis; cum flamma (secundum densitatem), non minus quam aër et liquores, innumeros recipiat gradus. Affirmat, *flammam vere et libenter locatam figi et constare,* non minus quam aërem vel aquam, nec esse rem momentaneam et successivam tantum in mole sua, per renovationem et alimentum, ut hic fit apud nos. Affirmat, *flammam habere naturam coitivam vel congregativam in globos,* quemadmodum natura terrea, minime similem aëri et aquæ, quæ congregantur in orbibus et interstitiis globorum, sed nusquam in globos integros. Affirmat, *eandem naturam flammeam in loco proprio* (*id est cœlo stellato*) *spargi glomerationibus infinitis,* ita tamen ut non exuatur dualitas illa, ætheris et sideris, nec continuetur flamma in empyreum integrum. Affirmat, *sidera veras flammas esse,* sed actiones flammæ in cœlestibus neutiquam trahendas ad actiones flammæ nostræ, quarum pleræque per accidens tantum perfunguntur. Affirmat, *ætherem interstellarem et sidera habere rationes ad invicem aëris et flammæ, sed sublimatas et rectificatas.* Atque de substantia Thematis sive Systematis Universi, hujusmodi quædam occurrunt. Nunc de motibus cœlestium dicendum, cujus gratia hæc adduximus. Consentaneum videtur ut quies non tollatur e natura, secundum aliquod totum (nam de particulis nunc non est sermo). Hoc (missis argutiis dialecticis et mathematicis) ex eo maxime liquet, quod incitationes et celeritates motuum cœlestium remittant se per gradus, ut desituræ in aliquod immobile; et quod etiam cœlestia participant ex quiete secundum polos; et quod si tollatur immobile, dissolvitur et spargitur systema. Quod si sit coacervatio quædam et massa naturæ immobilis, non videtur ulterius quærendum, quin ea sit globus terræ. Compactio enim densa et arctata materiæ inducit dispositionem erga motum torpescentem et aversam; quemadmodum contra, explicatio laxa promptam vel habilem. Neque male introducta est a Telesio (qui instauravit philosophiam Parmenidis et disputationes in libro de *primo frigido*) in naturam, non certe coëssentialitas et conjugatio (quod ille vult), sed tamen affinitas et conspiratio; videlicet ex altera parte, Calidi, Lucidi, Tenuis et Mobilis, et ex parte opposita, Frigidi, Opaci, Densi, et Immobilis; ponendo sedem primæ conspirationis in cœlo, secundæ in terra. Quod si ponatur *quies et immobile,* videtur etiam poni debere *motus absque termino et summe mobile,* maxime in naturis oppositis. Is motus est fere rotationis, qualis invenitur in genere in cœle-

stibus. Agitatio enim in circulo terminum non habet, et videtur manare ex appetitu corporis, quod movet solummodo ut moveat et se sequatur, et proprios petat amplexus, et naturam suam excitet, eaque fruatur, et propriam operationem exerceat; cum contra, latio in recta, itineraria videatur, et movere ad terminum cessationis sive quietis, et ut aliquid assequatur et dein motum suum deponat. Itaque de motu isto rotationis, qui est motus verus et perennis et cœlestibus vulgo putatur proprius, videndum quomodo se expediat, et quo moderamine se incitet et frænet, et qualia omnino patiatur. Quæ dum explicamus, formositatem illam mathematicam (ut motus reducantur ad circulos perfectos, sive eccentricos sive concentricos), et magniloquium illud (quod terra sit respectu cœli instar puncti, non instar quanti), et complura alia astronomorum inventa commentitia, ad calculos et tabulas relegabimus. At primo motus cœlestium dividemus. *Alii cosmici sunt, alii ad invicem.* Eos dicimus *cosmicos,* quos cœlestia ex consensu non cœlestium tantum, sed universitatis rerum nanciscuntur. Eos *ad invicem,* in quibus alia corpora cœlestia ex aliis pendent. Atque vera et necessaria est ista divisio. Terra itaque stante (id enim nunc nobis videtur verius)[1], manifestum est cœlum motu diurno circumferri, cujus motus mensura est spatium viginti quatuor horarum vel circiter: consequentia autem ab oriente in occidentem; conversio super puncta certa (quos polos vocant) australe et boreale. Etenim non jactantur cœli super polos mobiles, nec rursus alia sunt puncta quam quæ diximus. Atque hic motus vere videtur cosmicus, atque ideo unicus, nisi quatenus recipit et decrementa et declinationes; secundum quæ decrementa et declinationes transverberat motus iste universum rerum mobilium, et permeat a cœlo stellato usque ad viscera et interiora terræ; non raptu aliquo prehensivo aut vexativo, sed consensu perpetuo. Atque iste motus in cœlo stellato perfectus est et integer, tam mensura justa temporis quam restitutione plena loci. Quanto autem deceditur e sublimi, tanto iste motus imperfectior est, respectu tarditatis, et respectu etiam

[1] Bacon, in his later writings, rejected more decidedly than in this passage the doctrine of the earth's motion. Thus in the *Nov. Org.* ii. 46., it is said that Galileo's theory of the tides is founded on a "concessum non concessibile," namely, that the earth moves; and, in the third book of the *De Augmentis,* Bacon, in speaking of the cumbrous machinery of the Ptolemaic system, remarks, "harum suppositionum absurditas in motum terræ diurnum (quod nobis constat falsissimum esse) homines impegit."

aberrationis a motu circulari. Ac primo de tarditate dicendum separatim. Affirmamus Saturnum motu diurno tardius moveri, quam ut circumferatur aut restituatur ad idem punctum intra viginti quatuor horas, sed cœlum stellatum incitatius ferri, et prævertere Saturnum eo excessu, qui intra tot dies quot annos conficiunt triginta, universo cœli ambitui respondeat. Similiter de reliquis planetis dicendum, pro diversitate periodorum cujusque planetæ; adeo ut motus diurnus cœli stellati (in ipsa periodo, absque respectu ad magnitudinem circuli) sit fere per horam unam velocior quam motus diurnus lunæ. Si enim luna cursum suum 24 diebus posset expedire, tum excessus ille horæ integræ foret. Itaque motus decantatus *adversitatis et renitentiæ* ab occidente in orientem, qui attribuitur planetis tanquam proprius, verus non est, sed tantum per apparentiam, ex præcursione cœli stellati occidentem versus, et relictione a tergo planetarum versus orientem. Quo posito, manifestum est velocitatem istius motus cosmici, ordine non perturbato, descendendo decrescere, ut quo propius quique planeta appropinquet ad terram, eo tardius moveat; cum recepta opinio ordinem perturbet et invertat; et motum proprium tribuendo planetis, in illud absurdum incidat, ut planetæ, quo propinquiores sint ad terram (quæ est sedes naturæ immobilis) eo velocius moveri ponantur, id quod per remissionem violentiæ primi mobilis, astronomi excusare nugatorie et infeliciter conantur. Quod si cui mirum videatur, tantis spatiis quanta sunt a cœlo stellato ad lunam, motum istum tam parvis partibus, minus scilicet hora una, quæ est motus diurni pars 24^{a}, decrescere: succurrit illud, quod singuli planetæ minores circulos, quo terræ propiores sint, conficiant, et breviore ambitu rotent; ut addito decremento magnitudinis circuli ad decrementum temporis sive periodi, motus iste insigniter decrescere cernatur. Atque hactenus de velocitate seorsim locuti sumus, perinde ac si planetæ (positi, exempli gratia, sub æquinoctio, aut aliquo ex parallelis) anteverterentur tantum a cœlo stellato, et ab invicem, sed tamen sub eodem illo circulo. Hæc enim simplex foret relictio absque obliquitate. At manifestum est, planetas non solum impari gradu contendere, sed nec ad idem punctum circuli reverti, verum deflectere versus austrum et boream, cujus deflexionis limites sunt tropici; quæ deflexio nobis Circulum Obliquum, et Diversam Politatem ejus progenuit; quemadmodum illa celeritatis inæqualitas motum illum Renitentiæ. Neque vero hoc etiam commento naturæ

rerum opus est, cum recipiendo lineas spirales (id quod proxime accedit ad sensum et factum) res transigatur, et ista salventur. Atque (quod caput rei est) spiræ istæ nil aliud sunt quam defectiones a motu circulari perfecto, cujus planetæ sunt impatientes. Prout enim substantiæ degenerant puritate, et explicatione, ita degenerant et motus. Evenit autem, quemadmodum in celeritate sublimiores planetæ feruntur velocius, humiliores tardius, ita etiam ut sublimiores planetæ propiores conficiant spiras, quæque circulos propius referant; humiliores vero, spiras magis disjunctas et hiantes. Deceditur enim perpetuo descendendo magis ac magis et a flore illo velocitatis et a perfectione motus circularis, ordine nusquam perturbato. In eo tamen planetæ conspirant (utpote corpora multum retinentia naturæ communis, licet aliter differentia) ut habeant eosdem limites deflexionis.[1] Neque enim Saturnus intra tropicos remeat, neque Luna extra Tropicos exspatiatur (et tamen de exspatiatione stellæ Veneris non negligendum quod ad aliquibus traditum et notatum est), sed universi planetæ, sive sublimiores sive humiliores, postquam ad tropicos perventum est se vertunt et retexunt, pertæsi minoris spiræ, qualis subeunda foret si polis magis appropinquarent; eamque jacturam motus, veluti destructionem naturæ suæ, exhorrentes. Utcunque enim in cœlo stellato et stellæ prope polos et stellæ circa æquinoctium ordines et stationes suas servant, aliæ ab aliis in ordinem redactæ, summa et æquabili constantia; planetæ nihilominus videntur esse hujusmodi mixtæ naturæ, ut nec breviorem gyrum omnino, nec ampliorem libenter ferant. Atque ista videntur nobis paulo meliora circa motus cœlestes, quam raptus et motuum repugnantia, et diversa politas zodiaci, et inversus ordo celeritatis, et hujusmodi, quæ nullo modo cum natura rerum conveniunt, licet pacem qualem qualem colant cum calculis. Neque ista non viderunt astronomi præstantiores; sed arti suæ intenti, et circa perfectos circulos inepti, et subtilitates captantes, et philosophiæ malum[2] morigeri, naturam sequi contempserunt. Verum istud sapientium arbitrium imperiosum in naturam, est ipsa vulgi simpli-

[1] It appears from this that Bacon was not aware of the obliquity to the ecliptic of all the planetary orbits.

[2] M. Bouillet corrects this into *male*, remarking "vulgo legitur malum quod construi nequit." He was apparently not aware that *malum* is used adverbially. If any change were made, I should prefer to read *malæ*.

citate et credulitate deterius; si quis manifesta, quia sunt manifesta, fastidit.[1] Et tamen ingens est illud malum, et latissime patet; ut ingenium humanum, cum par rebus esse non possit, supra res esse malit. Jam vero inquirendum utrum motus iste unicus et simplex, in circulo et spira, ab oriente in occidentem, super polos certos australem et borealem, desinat et terminetur cum cœlo, an etiam deducatur ad inferiora. Neque enim liberum erit hujusmodi placita confingere hic in proximo, qualia supponunt in cœlestibus. Itaque si in his regionibus quoque reperiatur ille motus, apparebit etiam in cœlo eum talem esse secundum naturam communem sive cosmicam, qualem nos illam experimur. Primo itaque plane constat, illum cœli terminis non contineri. Verum hujusce rei demonstrationes et evidentias in Anticipatione nostra de Fluxu et Refluxu Maris plene tractavimus; itaque ad illam homines rejicimus; et hoc velut posito et concesso, ad reliquos motus cœlestium pergemus. Eos autem non Cosmicos, sed ad invicem esse diximus. Quatuor sunt genera motuum in cœlestibus visibilium, præter eum quem diximus Cosmicum, qui est motus diurnus per spiras intra tropicos. Aut enim attolluntur stellæ altius, et rursus demittuntur humilius, ut sint longius et propius a terra: aut flectunt se et sinuant per latitudinem zodiaci, excurrendo magis ad austrum aut magis ad boream, atque efficiendo eos quos vocant Dracones: aut incitatione atque etiam consecutione motus (hæc enim duo conjungimus) variant, gradiendo aliquando celerius, aliquando tardius, aliquando in progressu, aliquando in regressu, aliquando etiam stando et morando; aut ad distantiam aliquam a sole magis aut minus alligantur et circumscribuntur. Horum causas et naturas reddemus tantum in genere et per capita; id enim hoc loco nostrum postulat institutum. Verum ad hoc ut viam præmuniamus et aperiamus, dicendum aperte quid sentiamus de quibusdam tam placitis philosophicis quam hypothesibus astronomicis, et de observationibus etiam astronomorum per varia secula, ex quibus artem suam instaurant; quæ omnia videntur nobis esse erroris et confusionis plena. Sunt itaque axiomata sive potius placita nonnulla, quæ a philosophis accepta, et in astronomiam translata, et male credita, artem corruperunt. Simplex autem erit rejectio et judicium nostrum;

[1] *fastidii* in the original: first corrected, I believe, by Birch.—*J. S.*

neque enim tempus refutationibus terere convenit. Horum primum est, quod omnia supra lunam inclusive sint incorruptibilia, neque novas generationes aut mutationes ullo modo patiantur. De quo alibi dictum est, quod sit superstitio et vaniloquium. Verum ex hoc fonte illud ingens malum, quod ex omni anomalia novas atque (ut putant) emendatas confingant astronomi theorias, et rebus sæpius tanquam fortuitis applicant causas æternas et invariabiles. Secundum est, quod cœlo (cum sit scilicet ex essentia quinta et minime elementari) non competant actiones illæ turbulentæ, compressionis, relaxationis, repulsionis, cessionis, et similium, quæ videntur progigni a mollitia quadam corporum et duritia, quæ habentur pro qualitatibus elementaribus. Hæc vero assertio est abnegatio insolens et licentiosa rerum et sensus. Ubicunque enim corpus naturale positum sit, ibi est antitypia quoque, idque pro modo corporis. Ubicunque vero corpora naturalia et motus localis, ibi vel repulsio, vel cessio, vel sectio; hæc enim quæ dicta sunt, compressio, relaxatio, repulsio, cessio, cum multis aliis, sunt passiones materiæ catholicæ ubique locorum. Attamen ex hoc fonte nobis emanavit illa multiplicatio circulorum perplexorum ad libitum, quos tamen volunt ita et consignari inter se, et alios intra alios moveri et verti tanto lævore et lubricitate, ut nulla nihilominus sit impeditio, nulla fluctuatio; quæ omnia phantastica plane sunt et rebus insultant. Tertium est, quod singulis corporibus naturalibus singuli competant motus proprii; et si plures inveniantur motus, omnes, excepto uno, sint aliunde, et ex movente aliquo separato. Quo falsius quicquid nec excogitari potest, cum universa corpora ex multiplici rerum consensu motibus etiam pluribus prædita sint, aliis dominantibus, aliis succumbentibus, aliis etiam latentibus nisi provocentur; proprii autem rerum motus nulli sint nisi mensuræ exactæ, et modi motuum communium. Atque hinc rursus nobis prodiit primum mobile separatum, et cœli super cœlos, et inædificationes novæ continenter, ut motuum tam diversorum præstationibus sufficere possint. Quartum est, quod omnes motus cœlestium dispensentur per circulos perfectos; quod onerosum valde est, et portenta illa eccentricorum et epicyclorum nobis peperit; cum tamen, si naturam consuluissent, motus ordinatus et uniformis sit circuli perfecti; motus vero ordinatus, sed multiformis, qualis invenitur in cœlestibus compluribus, sit aliarum linearum; meritoque Gilbertus hæc deridet, quod non verisi-

mile sit naturam confinxisse rotas, quæ, exempli gratia, in circuitu contineant milliare unum aut alterum, ad hoc ut feratur pila palmaris.[1] Tantulæ enim magnitudinis videtur esse corpus planetæ ad eos quos ad deferendum illud fingunt circulos. Quintum est, quod stellæ sint partes orbis sui tanquam clavo fixæ. Hoc vero evidentissime est commentum eorum qui mathemata, non naturam tractant, atque motum corporum tantum stupide intuentes, substantiarum omnino obliviscuntur. Ista enim fixatio, particularis est affectus rerum compactarum et consistentium, quæ firmas habent prehensiones ob pressuras partium. Inopinabile autem prorsus est si transferatur ad mollia vel liquida. Sextum est, quod stella sit densior pars orbis sui; illæ vero neque partes sunt, neque densiores.[2] Non enim homogenea sunt cum æthere, et gradu tantum, sed plane heterogenea, et substantia differunt; atque ea quoque substantia quoad densitatem rarior est et magis explicata quam ætherea. Sunt et alia complura placita ejusdem vanitatis; sed hæc ad id quod agitur sufficient. Atque hæc de placitis philosophiæ circa cœlestia dicta sint. Quod vero ad hypotheses astronomorum attinet, inutilis fere est earum redargutio, quæ nec ipsæ pro veris asseruntur, et possint esse variæ, et inter se contrariæ, ut tamen phænomena æque salvent et concinnent. Itaque sit cautum, si placet, inter astronomiam et philosophiam, tanquam fœdere convenienti et legitimo, ut scilicet astronomia præhabeat hypotheses quæ maxime expeditæ sunt ad compendia computandi, philosophia eas quæ proxime accedunt ad veritatem naturæ; atque ut astronomiæ hypotheses rei veritati non præjudicent, et philosophiæ decreta talia sint, quæ sint super phænomena astronomiæ explicabilia. Atque de hypothesibus ita esto. At de observationibus astronomicis quæ accumulantur assidue, quæque jugiter a cœlo tanquam aquæ scaturiunt, illud omnino homines monitos volumus; ne forte de illis verum sit quod eleganter fingitur de musca Æsopi, quæ sedens super temonem currus Olympici, Quantum, inquit, pulverem ego excito? Ita observatio aliqua pusilla, eaque quandoque instrumento, quandoque oculo, quandoque calculo titubans, quæque possit esse propter veram aliquam in cœlo mutationem, novos cœlos et novas sphæras et circulos excitat. Neque hæc eo dicimus, quod remitti debeat aliqua industria

[1] Physiologia Nova, ii. 11.

[2] See Arist. De Cœlo, ii. 7.

observationum et historiæ, quam omnibus modis acuendam et intendendam esse dicimus, sed tantummodo ut adhibeatur prudentia et summa et sedata judicii maturitas, in abjiciendis aut mutandis hypothesibus. Itaque patefacta jam via, de motibus ipsis dicemus pauca et in genere. Quatuor autem genera esse diximus motuum majorum in cœlestibus. *Motum per profundum cœli* attollentem et demittentem; *motum per latitudinem zodiaci* exspatiantem ad austrum et boream; *motum per consequentiam zodiaci*, citum, tardum, progressivum, retrogradum, statarium; et *motum elongationis* a sole. Neque objiciat quispiam, motum illum secundum latitudinis, sive draconum, potuisse referri ad motum illum magnum cosmicum, cum sit inclinatio alternans versus austrum et boream, quod et spiræ illæ de tropico in tropicum similiter sunt, nisi quod ille motus sit tantum spiralis, iste vero etiam sinuosus et minoribus multo intervallis. Neque enim hoc nos fugit. Sed plane non sinit constans et perpetuus motus solis in ecliptica absque latitudine et draconibus, qui tamen sol communicat cum cæteris planetis quoad spiras inter tropicos, nos in hac opinione versari. Itaque alii fontes et hujus et reliquorum trium motuum quærendi sunt. Atque hæc sunt illa, quæ circa motus cœlestium nobis videntur minus habere incommodi. Videndum vero quid negent, et quid affirment. Negant *terram rotare.* Negant *esse in cœlestibus duos motus ab oriente in occidentem alterum*[1]; atque affirmant *anteversionem et relictionem.* Negant *obliquum circulum et diversam politatem ejus;* et affirmant *spiras.* Negant *primum mobile separatum et raptum:* et affirmant *consensum cosmicum tanquam commune vinculum systematis.* Affirmant *motum diurnum inveniri non in cœlo, sed et in aëre, aquis, etiam extimis terræ, quoad verticitatem.* Affirmant *consecutionem et volubilitatem illam cosmicam in fluidis, esse verticitatem et directionem in consistentibus, usque quo perveniatur ad immobile sincerum.* Negant *stellas figi tanquam nodos in tabula.* Negant *eccentricos, epicyclos, et hujusmodi fabricas esse reales.* Affirmant *motum magneticum sive congregativum vigere in astris, ex quo ignis ignem evocat et attollit.* Affirmant *in cœlis planetarum corpora planetarum velocius moveri et rotare quam reliquum cœli ubi siti sunt, quod utique rotat, sed tardius.* Affirmant *ex ea inæqualitate fluctus et undas et reciprocationes*

[1] So in the original. Supply, according to M. Bouillet's suggestion, *alterum ab occidente in orientem.* — *J. S.*

ætheris planetarum, atque ex iis varios motus educi. Affirmant *necessitatem in planetis volvendi celerius et tardius, prout locantur in cœlo sublimius aut humilius, idque ex consensu universi.* Sed simul affirmant *tædium præternaturalis incitationis in planetis et majoris et minoris circuli.* Affirmant *solisequium ex natura inopiosa in ignibus infirmioribus Veneris et Mercurii;* cum etiam inventæ sint a Galilæo stellulæ errantes Jovis asseclæ. Ista autem nos tanquam in limine historiæ naturalis et philosophiæ stantes prospicimus, quæ quanto quis magis se immerserit in historiam naturalem, tanto fortasse probabit magis. Attamen testamur iterum nos hic teneri nolle. In his enim, ut in aliis, certi viæ nostræ sumus, certi sedis nostræ non sumus. Hæc vero interfati sumus, ne quis existimet nos vacillatione judicii aut inopia affirmandi negativas quæstiones malle. Itaque tenebimus, quemadmodum cœlestia solent (quando de iis sermo sit), mobilem [1] constantiam.

[1] ["nobilem" in the original.] The sense requires *mobilem*, and the antithesis *mobilis constantia* is I think quite in Bacon's manner.

DE

INTERPRETATIONE NATURÆ

SENTENTIÆ XII.

PREFACE

TO THE

DE INTERPRETATIONE NATURÆ

SENTENTIÆ XII.

THE next piece is not properly a fragment, being complete in itself. It is one of the many drafts of that great "speech of preparation" which Bacon turned into so many different shapes before it issued finally in the first book of the *Novum Organum*. Of the rejected forms this is perhaps the most remarkable for weight, condensation, and comprehensiveness. It was first published by Gruter in 1653, who places it among the *Impetus Philosophici;* and though the typographical arrangement makes it seem to be connected with the *Tradendi Modus legitimus* which follows, I think this must have been by accident or error. It exactly answers to its own title, which contains nothing that should lead one to expect a sequel; while on the other hand there is nothing in the *Tradendi Modus legitimus* which seems to require an introduction.

Considering it then as a separate piece, there seem to be no data for determining when it was composed; though, judging by the form and style, I am myself inclined to refer it to the period when Bacon thought of throwing the exposition of his argument into a dramatic form; the rather because the allusions to the *ordinatæ chartarum sequelæ*, the *coordinationes, reordinationes, chartæ novellæ*, &c. belong to the days of the *Filum Labyrinthi*, when he was more occupied in perfecting and explaining his *method* than in taking steps for collecting a natural history,— not having then perceived so fully as I think

he afterwards did, how much of the Labyrinth must be explored before the clue could be obtained or used.

Both this piece and the *Aphorismi et Consilia* which follow have been printed by M. Bouillet as parts of the *Temporis Partus Masculus;* which he assumes to be the same work which Bacon says he composed at the age of twenty-four, under the title of *Temporis Partus Maximus.* My reasons for disagreeing with him on both points have been already stated.[1]

J. S.

[1] See above, p. 521., and Vol. I. p. 104.

DE INTERPRETATIONE NATURÆ

SENTENTIÆ XII.

De conditione hominis.

1. Homo, naturæ minister et interpres, tantum facit aut intelligit, quantum de naturæ ordine re vel mente observabit, ipse interim naturæ legibus obsessus.

2. Terminus itaque humanæ potentiæ ac scientiæ in dotibus quibus ipse præditus est a natura ad movendum et percipiendum, tum etiam in statu rerum præsentium. Ultra enim has bases illa instrumenta non proficiunt.

3. Dotes hæ per se tenues et ineptæ, rite tamen et ordine administratæ tantum possunt, ut res a sensu et actu remotissimas judicio et usui coram sistant, majoremque et operum difficultatem et scientiæ obscuritatem superent, quam quis adhuc optare didicerit.

4. Una veritas, una interpretatio: sensus autem obliquus, animus alienus, res importuna, ipsum tamen interpretationis opus magis declinans quam difficile.[1]

De impedimentis interpretationis.

5. Quisquis dubitationis impos et asserendi avidus principia demum statuet probata (ut credit) concessa et manifesta, ad quorum immotam veritatem cætera ut pugnantia vel obsecundantia recipiet vel rejiciet, is res cum verbis, rationem cum insania, mundum cum fabula commutabit, interpretari non poterit.

6. Qui omnem rerum distinctionem, quæ in constitutis vulgo speciebus vel etiam inditis nominibus elucescit, non miscuerit, confuderit, et in massam redegerit, non unitatem naturæ, non legitimas rerum lineas videbit, non interpretari poterit.

7. Qui primum et ante alia omnia animi motus humani penitus non explorarit, ibique scientiæ meatus et errorum se-

[1] Compare *Cogitata et Visa* (supra, p. 617.): *Nunc autem apparere viam non aliqua mole aut strue imperviam, sed ab humanis vestigiis deviam esse. — J. S.*

des, accuratissime descriptas non habuerit, is omnia larvata et veluti incantata reperiet, fascinum ni solverit interpretari non poterit.

8. Qui in rerum obviarum et compositarum causis exquirendis, veluti flammæ, somnii, febris, versabitur, nec se ad naturas simplices conferet; ad istas primo quæ populari ratione tales sunt, deinde etiam ad eas quæ arte ad veriorem simplicitatem reductæ sunt et veluti sublimatæ; is fortasse, si cætera non peccat, addet inventis quædam non spernenda, et inventis proxima. Sed nil contra majores rerum secularitates[1] movebit, nec Interpres dicendus erit.

De moribus interpretis.

9. Qui ad interpretandum accesserit, ita se comparet et componat. Sit nec novitatis, nec consuetudinis vel antiquitatis sectator, nec contradicendi licentiam, nec authoritatis servitutem amplectatur. Non affirmandi sit properus, nec in dubitationem solutus, sed singula gradu quodam probationis insignita provehat. Spes ei laboris, non otii author sit. Res non raritate, difficultate, aut laude, sed veris momentis æstimet. Privata negotia personatus[2] administret, rerum tamen provisus subvenerans. Errorum in veritates et veritatum in errores subingressus prudenter advertat, nihil contemnens aut admirans. Naturæ suæ commoditates norit. Naturæ aliorum morem gerat, cum nemo lapidi impingenti succenseat. Uno veluti oculo rerum naturas, altero humanos usus pererret. Verborum mixtam naturam, et juvamenti et nocumenti inprimis participem, distincte sciat. Artem inveniendi cum invento adolescere statuat. Sit etiam in scientia quam adeptus est nec occultanda nec proferenda vanus, sed ingenuus et prudens, tradatque inventa non ambitiose aut maligne, sed modo primum maxime vivaci et vegeto, id est ad injurias temporis munitissmo, et ad scientiam

[1] Popular opinions, or such as flourish in the *sæculum* or world, or through ages, *sæcula*. See Vossius.

[2] That is, I apprehend, affecting more interest in them than he feels. Compare Cicero's phrase, "Cur ego personatus ambulem?" — *Ep. ad Att.* xv. 1. [Rather, I should think, "speaking to people in their own language." I cannot say that I clearly understand the sentence; but I think it must refer to the necessity of using popular ideas for popular purposes. Compare *Redargutio Philosophiarum* (supra, p. 562.): *Servate itaque illam alteram* (*i. e.* the popular philosophy), *et prout commodum vobis erit adhibete; atque aliter cum natura aliter cum populo negotiamini. Nemo enim est qui plus multo quam alius quis intelligit, quin ad minus intelligentem* tanquam personatus sit, *ut se exuat, alteri det.* I am inclined to think that there should be a full stop after *administret,* and a comma after *subvenerans.* — *J. S.*]

propagandam fortissimo, deinde ad errores pariendos innocentissimo, et ante omnia, qui sibi legitimum lectorem seponat.

De officio interpretis.

10. Ita moratus et comparatus interpres ad hunc modum procedat. Conditionem hominis reputabit, impedimenta interpretationis removebit, tum ad opus accinctus historiam parabit et ordinatas chartarum sequelas, unaque usus, co-ordinationes, occurrentias et schedulas instituet. Rerum solitudinem et sui similitudinem repræsentabit. Quin et rerum delectum habebit, quæque maxime primitivæ sunt vel instantes, id est vel rerum aliarum inventioni, vel humanis necessitatibus præcipue conducunt, præordinabit. Instantiarum etiam præeminentias [1] observabit, quæ ad operis compendium plurimum possunt. Atque ita instructus re-ordinationes demum, et chartas novellas, ac ipsam interpretationem facilem jam et sponte sequentem, imo mente fere præreptam, mature et feliciter aggredietur et perficiet. Quod ubi fecerit, continuo veros, æternos, et simplicissimos naturæ motus, ex quorum ordinato et calculatissimo progressu infinita hæc tum præsentis tum omnis ævi varietas emergit, pura et nativa luce videbit et numerabit. Interimque ab initio operis humanis rebus multa et incognita, veluti fœnus, assidue recipere non omittet. Sed hinc denuo totus in humanos usus rerumque præsentium statum conversus et intentus, omnia diversa via et ad actionem ordinabit et disponet. Naturis secretissimis alias declaratorias, et absentissimis alias superinductorias assignabit. Et deinde tandem veluti altera natura plerumquitates condet, quarum errores pro monstris sint, salva etiam tamen sibi artis prærogativa.

De provisu rerum.

11. Tu autem spe et studio languidis hæc hauris (fili) mirarisque si tanta supersit operum fructuosissimorum et prorsus incognitorum ubertas, ea non antehac, aut jam subito esse inventa; simul etiam cujusmodi ea sint, nominatim requiris, visque tibi aut immortalitatem, aut indolentiam, aut voluptatem transportantem promitti. Verum tu tibi largire (fili) spemque ex scientia aucupabere, ut ex ignorantia desperationem cepisti.[2]

[1] To these Bacon afterwards gave the name of Prerogativæ.
[2] *cæpisti* in the original. — *J. S.*

An etiam arte adoptandum est opus? At dubitationi tuæ quoad licet satisfaciam, moremque tibi geram. Quod hæc subito nota sint, nil mirum, fili. Scientia celeris, tempus tardi partus est. Etiam nobilia quæ ante hæc inventa sunt, non luce prioris cognitionis sensim, sed casu (ut loquuntur) affatim inventa sunt. In mechanicis autem est quædam rei jam inventæ extensio, sed novæ inventionis nomen non meretur. Non longum (fili) sed ambiguum est iter. Quod autem hæc non ante hoc tempus in conspectum se dedisse ais [1], an tibi compertum est quantum omni antiquitati, vel omnibus in regionibus, vel etiam singulis hominibus innotuerit? Sed fere assentior tibi (fili) teque altius manu ducam. Non dubitas quin si homines non forent, multa eorum quæ arte (ut loquuntur) facta sunt, defutura fuissent, ut statuam marmoream, stragulam vestem. Age vero, et homines an non habent et ipsi suos motus quibus obtemperant? Sane (fili) magis subtiles, et difficilius a scientia comprehensos, sed æque certos. Profecto, inquies, homines voluntati parent. Audio, sed hoc nihil est. Qualis causa est fortuna in universo, talis est voluntas in homine.[2] Si quid ergo nec sine homine producitur, et jacet etiam extra hominis vias, an non nihilo æquale est? Homo etiam in quædam veluti occurrentia impingit, alia fine præviso et mediis cognitis exequitur. Mediorum tamen notitiam ex obviis sumit. Quo igitur in numero reponentur ea, quæ nec effectum obvium, nec operationis modum et lucem ex obviis sortiuntur. Talia opera *Epistemides* vocantur, id est scientiæ filiæ, quænon alias in actum veniunt quam per scientiam et interpretationem meram, cum nihil obvii contineant. Inter hæc autem et obvia quot gradus numerari putas? Tene (fili) et obsigna.

12. Postremo loco tibi consulo (fili) quod facto imprimis opus est, hoc est, ut mente illuminata et sobria interpretationem rerum divinarum et naturalium distinguas, neve has ullo modo inter se committi patiare. Satis erratum est in hoc genere. Nihil hic nisi per rerum inter se similitudines addiscitur. Quæ licet dissimillimæ videantur, premunt tamen similitudinem germanam interpreti notam. Deus autem sibi [3] tantum similis est absque tropo. Quare nullam ad ejus cognitionem hinc lucis sufficientiam expecta. Da fidei, quæ fidei sunt.

[1] *aio* in the original. — *J. S.*
[2] Fortune is spoken of in the *Nov. Org.* (i. 60.) as nomen rei quæ non est.
[3] *tibi* in the original. — *J. S.*

APHORISMI ET CONSILIA.

PREFACE

TO THE

APHORISMI ET CONSILIA.

THE fragment which follows stands in Gruter's volume (in which it first appeared) immediately before the *Sententiæ XII.*; but there is evidently no connexion between the two, and I conclude that this was the later written from its nearer resemblance to the *Novum Organum* in those passages which occur in all three, and can be compared.

When it was written is another question, and one on which I can offer no opinion. A memorandum in the *Commentarius Solutus*, 26. July, 1608,—"The finishing of the *Aphorisms*, Clavis Interpretationis, and then setting forth of the book,"—refers no doubt to some paper of the kind; some early rudiment of the *Novum Organum;* but it is impossible to say whether the *Aphorisms* alluded to are these or not. The note at the end, *reliqua non erant perfecta*, implying that the paper had been laid by in its unfinished state, makes the memorandum particularly applicable to them. The notes to this are Mr. Ellis's.

J. S.

FRANCISCI BACONI

APHORISMI ET CONSILIA, DE AUXILIIS MENTIS,

ET

ACCENSIONE LUMINIS NATURALIS.

Homo, naturæ minister et interpres, tantum facit et intelligit, quantum de ordine naturæ opere vel mente observaverit; nec amplius novit aut potest.[1]

Manus hominis nuda, quantumvis robusta et constans, ad opera pauca et facile sequentia sufficit: eadem ope instrumentorum, multa et reluctantia vincit. Similis est et mentis ratio.

Instrumenta manus, motum aut cient aut regunt: et instrumenta mentis, intellectui aut suggerunt aut cavent.[2]

Super datam materiæ basim naturam quamvis imponere, intra terminos possibiles[3], intentio est humanæ potentiæ. Similiter dati effectus in quovis subjecto causas nosse, intentio est humanæ scientiæ: quæ intentiones in idem coincidunt. Nam quod in contemplatione instar causæ est, in operatione instar medii est.[4]

Qui causam alicujus naturæ, veluti albedinis aut caloris, in certis tantum subjectis novit, ejus scientia imperfecta est. Et qui effectum super certam tantum materiam ex iis quæ sunt susceptibiles inducere potest, ejus potentia pariter est imperfecta.[5]

Qui causas naturæ alicujus in aliquibus subjectis tantum novit, is efficientem aut materiatam causam novit, quæ causæ fluxæ sunt, et nihil aliud quam vehicula, et causæ formam deferentes. Qui autem unitatem naturæ in materiis dissimillimis comprehendit, is formas rerum novit.

Qui efficientes et materiatas causas novit, is jampridem inventa componit aut dividit, aut transfert aut producit; etiam ad

[1] Nov. Org. i. 1.

[2] Ib. i. 2.

[3] So in the original. *Possibilis* is the reading in other places where the expression occurs, and probably the true reading here. — *J. S.*

[4] Ib. ii. 1. and i. 3.

[5] Ib. ii. 3. to which correspond also the next four aphorisms.

nova inventa in materia aliquatenus simili et præparata pertingit: terminos rerum altius fixos non movet.

Qui formas novit, is quæ adhuc facta non sunt, qualia nec naturæ vicissitudines nec experimentales industriæ unquam in actum produxissent, neque cogitationem humanam subitura fuissent, detegit et educit.

Eadem est veritatis et potestatis via et perfectio: hæc ipsa, ut formæ rerum inveniantur: ex quarum notitia sequitur contemplatio vera et operatio libera.

Formarum inventio simplex est et unica, quæ procedit per naturarum exclusionem sive rejectionem. Omnes enim naturæ, quæ aut data natura præsente absunt, aut data natura absente adsunt, ex forma non sunt; atque post rejectionem aut negationem completam, manet forma et affirmatio. Exempli gratia, si caloris formam inquiras, et aquam calentem invenias nec lucidam, rejice lumen: si aërem tenuem invenias, nec calidum, rejice tenuitatem. Hoc breve dictu est; sed longo circuitu ad hoc pervenitur.[1]

Prolatio verborum contemplativa aut operativa re non differunt. Cum enim hoc dicis, Lumen non est ex forma caloris; idem est ac si dicas, In calore producendo non necesse est ut etiam lumen producas.[2]

Reliqua non erant perfecta.

Neque hæc numine nostro eunt. Tu, Pater, conversus ad opera quæ fecerunt manus tuæ, vidisti quod omnia essent bona valde: homo autem conversus ad opera quæ fecerunt manus suæ, vidit quod omnia essent vanitas et vexatio spiritus. Itaque si in operibus tuis sudabimus, facies nos gratulationis tuæ et sabbati tui participes. Supplices rogamus ut hæc mens nobis constet; atque ut per manus nostras familia humana novis eleemosynis tuis dotetur. Hæc æterno amori tuo commendamus, per Jesum nostrum, Christum tuum, nobiscum Deum.[3]

[1] Nov. Org. ii. 16. [2] Ib. ii. 17.
[3] Compare the prayer with which the *Distributio Operis* concludes.

PHYSIOLOGICAL AND MEDICAL REMAINS.

PREFACE

TO THE

PHYSIOLOGICAL AND MEDICAL REMAINS.

THE following pieces were first published by Tenison in 1679, in a single volume entitled "Baconiana, or certain genuine Remains of Sir Francis Bacon Baron of Verulam and Viscount of St. Alban's; in arguments Civil, Moral, Natural, Medical, Theological, and Bibliographical; now for the first time faithfully published;" with an introduction professing to give "an account of all the Lord Bacon's works."

Tenison was intimate at college with William Rawley the Doctor's son, and afterwards with John Rawley his executor. Through them he had access to the Bacon manuscripts which had been left in the Doctor's hands, and may therefore be considered as an original authority in the matter. He was not a man of much sagacity or intellectual vigour; and there is reason to believe that he sometimes took leave to alter the text a little, when it contained expressions which he thought undignified. But he was a great venerator of Bacon, and upon the whole a careful, conscientious, and scholar-like editor. He assures us that he has printed nothing as Bacon's which he did not find either written in his own hand or transcribed by Dr. Rawley; and though some of the manuscripts appear to have been in a condition which required more judgment in the decipherer than he could perhaps be trusted for (for he compares his labour in extracting the sense to that of reducing mercury to its proper form after its divers shapes and transmutations), yet, with some little allowance on that account, they may be all accepted as authentic.

Those which he has collected under the respective titles of Physiological and Medical Remains (the *Abecedarium Naturæ* excepted, which has been printed already) may be considered

as loose notes or memoranda connected with the collection of Natural History; and as there are no means of guessing when they were written, this seems the fittest place for them. Being merely the remains of the collection from which Rawley had already selected all that he thought worth publishing, they are of little value, and little need be said about them.

They are all in Bacon's own English; except the latter portion of the *catalogue of bodies attractive and non-attractive*, which appears to have been written by him in Latin. Of the second—*articles of questions touching minerals*—a Latin translation by Rawley had been published in the *Opuscula Philosophica*, which I have not thought it necessary to reprint. The English original from which Tenison took it was one of three (he tells us); and the words "This is the clean copy" were written on the back of it in Bacon's own hand. These questions are not, I think, to be classed among the *Topicæ inquisitionis* which Bacon speaks of at the end of the *Parasceve;* they are not directions for the collection of a natural history of minerals *quæ sit in ordine ad condendam philosophiam*, but merely questions with a view to obtain better and cheaper manufactures. They were referred to one Dr. Meverel, a chemist of that day, whose answers Tenison has printed along with them. These answers, as they may perhaps throw some light upon the state of chemical science in Bacon's time, I have appended as notes.

The *experiments about weight in air and water* have some interest in connexion with Bacon's method of determining specific gravities, as explained in the *Historia Densi et Rari;* concerning which Mr. Ellis has contributed a valuable note.

Among the Physiological Remains, Tenison has inserted a *speech touching the recovering of drowned mineral works*, fathered upon Bacon by Edward Bushel, a great projector of such things, who in his early youth had been in Bacon's service. His story is that this speech was prepared by Bacon for the Parliament of 1621. But Tenison evidently did not believe it to be genuine; and it is in fact so manifest a fabrication that I have not admitted it at all into this edition. It is obviously a mere puff of some project of Bushel's own.

The other pieces sufficiently explain themselves.

J. S.

INQUISITIONS

TOUCHING

THE COMPOUNDING OF METALS,

BY

SIR FRANCIS BACON, BARON OF VERULAM.[1]

To make proof of the incorporation of iron with flint, or other stone. For if it can be incorporated without over-great charge, or other incommodity, the cheapness of the flint or stone doth make the compound stuff profitable for divers uses. The doubts may be three in number.

First; Whether they will incorporate at all, otherwise than to a body that will not hold well together, but become brittle and uneven?

Secondly; Although it should incorporate well, yet whether the stuff will not be so stubborn as it will not work well with a hammer, whereby the charge in working will overthrow the cheapness of the material?

Thirdly; Whether they will incorporate, except the iron and stone be first calcined into powder? And if not, Whether the charge of the calcination will not eat out the cheapness of the material?

The *uses* are most probable to be; *First* for the implements of the kitchen; as spits, ranges, cobirons, pots, &c. *then* for the wars, as ordnance, portcullises, grates, chains, &c.

Note; the finer works of iron are not so probable to be served with such a stuff; as locks, clocks, small chains, &c., because the stuff is not like to be tough enough.

For the better use in comparison of iron, it is like the stuff will be far *lighter:* for the weight of iron to flint is double and

[1] Baconiana, p. 92.

a third part; and, secondly, it is like to rust not so easily, but to be *more clean.*

The ways of trial are two. *First,* by the iron and stone of themselves, wherein it must be inquired, what are the stones that do easiliest melt. *Secondly,* with an additament, wherein brimstone is approved to help to the melting of iron or steel. But then it must be considered, whether the charge of the additament will not destroy the profit.

It must be known also what proportion of the stone the iron will receive to incorporate well with it, and that with once melting; for if either the proportion be too small, or that it cannot be received, but piece-meal by several meltings, the work cannot be of value.

To make proof of the incorporating of iron and brass. For the cheapness of the iron in comparison of the brass, if the uses may be served, doth promise profit. The doubt will be touching their incorporating; for that it is approved that iron will not incorporate neither with brass nor other metals of itself by simple fire: so as the inquiry must be upon the calcination, and the additament, and the charge of them.

The *uses* will be for such things as are now made of brass, and might be as well served by the compound stuff; wherein the doubts will be chiefly of the toughness and of the beauty.

First; therefore, if brass ordnance could be made of the compound stuff, in respect of the cheapness of the iron, it would be of great use.

The vantage which brass ordnance hath over iron, is chiefly, as I suppose, because it will hold the blow, though it be driven far thinner than the iron can be; whereby it saveth both in the quantity of the material, and in the charge and commodity of mounting and carriage, in regard by reason of the thinness it beareth much less weight: there may be also somewhat in being not so easily overheated.

Secondly; For the beauty; those things wherein the beauty or lustre are esteemed, are andirons, and all manner of images, and statues, and columns, and tombs, and the like. So as the *doubt* will be *double* for the beauty; the *one,* whether the colour will please so well, because it will not be so like gold as brass? the *other,* whether it will polish so well? Wherein for the latter it is probable it will; for steel glosses are more

resplendent than the like plates of brass would be; and so is the glittering of a blade. And besides, I take it, andiron brass, which they call white brass, hath some mixture of tin to help the lustre. And for the golden colour, it may be by some small mixture of orpiment, such as they use to brass in the yellow alchemy, it will easily recover that which the iron loseth. Of this the eye must be the judge upon proof made.

But now for pans, pots, curfews, counters, and the like; the beauty will not be so much respected, so as the compound stuff is like to pass.

For the better use of the compound stuff, it will be sweeter and cleaner than brass alone, which yieldeth a smell or soiliness, and therefore may be better for the vessels of the kitchen and brewing. It will also be harder than brass, where hardness may be required.

For the trial, the *doubts* will be *two: First*, the over-weight of brass towards iron, which will make iron float on the top in the melting. This perhaps will be holpen with the *calaminar stone*, which consenteth so well with brass, and, as I take it, is lighter than iron. The *other doubt* will be the stiffness and dryness of iron to melt; which must be holpen either by *moistening* the iron, or opening it. *For the first*, perhaps some mixture of lead will help; which is as much more liquid than brass, as iron is less liquid. The *opening* may be holpen by some mixture of sulphur: so as the trials would be with brass, iron, *calaminar stone*, and sulphur; and then again with the same composition, and an addition of some lead; and in all this the charge must be considered, whether it eat not out the profit of the cheapness of iron.

There be *two proofs* to be made of *incorporation of metals for magnificence and delicacy*. The *one* for the *eye*, and the *other* for the *ear*. Statua metal, and bell metal, and trumpet metal, and string metal; in all these, though the mixture of brass or copper should be dearer than the brass itself, yet the pleasure will advance the price to profit.

First therefore, for *statua-metal*, see *Pliny's* mixtures, which are almost forgotten, and consider the charge.

Try likewise the mixture of tin in large proportion with copper, and observe the colour and beauty, it being polished.

But chiefly let proof be made of the incorporating of copper or brass with glass-metal, for that is cheap, and is like to add a great glory and shining.

For *bell-metal*. *First*, it is to be known what is the composition which is now in use. *Secondly*, it is probable that it is the dryness of the metal that doth help the clearness of the sound, and the moistness that dulleth it; and therefore the mixtures that are probable, are steel, tin, glass-metal.

For *string-metal*, or *trumpet-metal*, it is the same reason; save that glass-metal may not be used, because it will make it too brittle; and trial may be made with mixture of silver, it being but a delicacy, with iron or brass.

To make proof of the incorporation of silver and tin in equal quantity, or with two parts silver and one part tin, and to observe whether it be of equal beauty and lustre with pure silver; and also whether it yield no soiliness more than silver? And again, whether it will endure the ordinary fire, which belongeth to chafing-dishes, posnets, and such other silver vessels? And if it do not endure the fire, yet whether by some mixture of iron it may not be made more fixt? For if it be in beauty and all the uses aforesaid equal to silver, it were a thing of singular profit to the state, and to all particular persons, to change silver plate or vessel into the compound stuff, being a kind of silver *electre*, and to turn the rest into coin. It may be also questioned, whether the compound stuff will receive gilding as well as silver, and with equal lustre? It is to be noted, that the common allay of silver coin is brass, which doth discolour more, and is not so neat as tin.

The drownings of metals within other metals, in such sort as they can never rise again, is a thing of great profit. For if a quantity of silver can be so buried in gold, as it will never be reduced again, neither by fire, nor parting waters, nor otherways: and also that it serve all uses as well as pure gold, it is in effect all one as if so much silver were turned into gold; only the weight will discover it; yet that taketh off but half of the profit; for gold is not fully double weight to silver, but gold is twelve times price to silver.

The burial must be by one of these two ways, either by the

smallness of the proportion, as perhaps fifty to one, which will be but six-pence gains in fifty shillings; or it must be holpen by somewhat which may fix the silver, never to be restored or vapoured away, when it is incorporated into such a mass of gold; for the less quantity is ever the harder to sever: and for this purpose iron is the likest, or coppel stuff, upon which the fire hath no power of consumption.

The making of gold seemeth a thing scarcely possible; because gold is the heaviest of metals, and to add matter is impossible: and again, to drive metals into a narrower room than their natural extent beareth, is a condensation hardly to be expected. But to make silver seemeth more easy, because both quicksilver and lead are weightier than silver; so as there needeth only fixing, and not condensing. The degree unto this that is already known, is infusing of quicksilver in a parchment, or otherwise, in the midst of molten lead when it cooleth; for this stupifieth the quicksilver that it runneth no more. This trial is to be advanced three ways. *First*, by iterating the melting of the lead, to see whether it will not make the quicksilver harder and harder. *Secondly*, to put *realgar* hot into the midst of the quicksilver, whereby it may be condensed as well from within as without. *Thirdly*, to try it in the midst of molten iron, or molten steel, which is a body more likely to fix the quicksilver than lead. It may be also tried, by incorporating powder of steel, or coppel dust, by pouncing into the quicksilver, and so to proceed to the stupifying.

Upon glass four things would be put in proof. The *first*, means to make the glass more crystalline. The *second*, to make it more strong for falls, and for fire, though it come not to the degree to be malleable. The *third*, to make it coloured by tinctures, comparable [to] or exceeding precious stones. The *fourth*, to make a compound body of glass and galletyle; that is, to have the colour milky like a *chalcedon*, being a stuff between a porcelane and a glass.

For the *first;* it is good first to know exactly the several materials whereof the glass in use is made; window glass, Normandy and Burgundy, ale-house glass, English drinking

glass: and then thereupon to consider what the reason is of the coarseness or clearness; and from thence to rise to a consideration how to make some additaments to the coarser materials, to raise them to the whiteness and crystalline splendour of the finest.

For the *second;* we see pebbles, and some other stones, will cut as fine as crystal, which if they will melt, may be a mixture for glass, and may make it more tough and more crystalline. Besides, we see metals will vitrify; and perhaps some portion of the glass of metal vitrified, mixed in the pot of ordinary glass-metal, will make the whole mass more tough.

For the *third;* it were good to have of coloured window glass, such as is coloured in the pot, and not by colours ———[1]

* * * * *

It is to be known of what stuff *galletyle* is made, and how the colours in it are varied; and thereupon to consider how to make the mixture of glass-metal and them, whereof I have seen the example.

Enquire what be the stones that do easiliest melt. Of them take half a pound, and of iron a pound and a half, and an ounce of brimstone, and see whether they will incorporate, being whole, with a strong fire. If not, try the same quantities calcined: and if they will incorporate, make a plate of them, and burnish it as they do iron.

Take a pound and a half of brass, and half a pound of iron; two ounces of the *calaminar* stone, an ounce and a half of brimstone, an ounce of lead; calcine them, and see what body they make; and if they incorporate, make a plate of it burnished.

Take of copper an ounce and a half, of tin an ounce, and melt them together, and make a plate of them burnished.

Take of copper an ounce and a half, of tin an ounce, of glass-metal half an ounce; stir them well in the boiling, and if they incorporate, make a plate of them burnished.

Take of copper a pound and a half, tin four ounces, brass two ounces; make a plate of them burnished.

Take of silver two ounces, tin half an ounce; make a little say-cup of it, and burnish it.

[1] Here something is wanting in the copy. — *Note by Tenison.*

To enquire of the materials of every of the kind of glasses coarser and finer, and of the proportions.

Take an equal quantity of glass-metal, of stone calcined, and bring a pattern.

Take an ounce of vitrified metal, and a pound of ordinary glass-metal, and see whether they will incorporate; and bring a pattern.

Bring examples of all coloured glasses, and learn the ingredients whereby they are coloured.

Enquire of the substance of *galletyle.*

ARTICLES

OF

QUESTIONS TOUCHING MINERALS;

WRITTEN ORIGINALLY IN ENGLISH BY THE LORD BACON, YET HITHERTO NOT PUBLISHED IN THAT LANGUAGE.

The Lord Bacon's Questions and Solutions concerning the compounding, incorporating, or union of metals or minerals; which subject is the first letter of his Lordship's Alphabet.

Q. WITH what metals gold will incorporate by simple colliquefaction, and with what not? And in what quantity it will incorporate; and what kind of body the compound makes?

A. Gold with silver, which was the ancient electrum.

Gold with quicksilver. | Gold with copper. | Gold with iron.
Gold with lead. | Gold with brass. | Gold with tin.

So likewise of silver.

Silver with quicksilver. | Silver with iron. (*Plinius Secund.* lib. 33. ix.: *Miscuit denario triumvir Antonius ferrum.*)
Silver with lead.
Silver with copper.
Silver with brass. | Silver with tin.

So likewise of quicksilver.

Quicksilver with lead. | Quicksilver with brass.
Quicksilver with copper. | Quicksilver with iron.
Quicksilver with tin.

So of lead.

Lead with copper. | Lead with iron. | Lead with brass.
Lead with tin. (*Plin.* 34. ix.)

So of copper.

Copper with brass. | Copper with iron. | Copper with tin.

So of brass.

Brass with iron. | Brass with tin.

So of iron.

Iron with tin.

What be the compound metals that are common and known? And what are the proportions of their mixtures? As,

Latten of brass, and the *calaminar* stone.

Pewter of tin and lead.

Bell-metal of &c. and the counterfeit plate, which they call *alchemy*.

The decomposites of three metals or more, are too long to enquire of, except there be some compositions of them already observed.

It is also to be observed, whether any two metals, which will not mingle of themselves, will mingle with the help of another; and what.

What compounds will be made of metal with stone and other fossils; as latten is made with brass and the *calaminar* stone; as all the metals incorporate with vitriol; all with iron powdered; all with flint, &c.

Some few of these would be enquired of, to disclose the nature of the rest.

Whether metals or other fossils will incorporate with molten glass, and what body it makes?

The quantity in the mixture would be well considered; for some small quantity perhaps will incorporate, as in the allays of gold and silver coin.

Upon the compound body, three things are chiefly to be observed; the colour; the fragility or pliantness; the volatility or fixation, compared with the simple bodies.

For present use or profit, this is the rule: consider the price of the two simple bodies; consider again the dignity of the one above the other in use; then see if you can make a compound that will save more in price than it will lose in dignity of the use.

As for example; consider the price of brass-ordnance; consider again the price of iron-ordnance, and then consider wherein the brass-ordnance doth excel the iron-ordnance in use; then if you can make a compound of brass and iron that will be near as good in use, and much cheaper in price, then there is profit both to the private and the commonwealth. So of gold and silver, the price is double of twelve: the dignity of gold above silver is not much, the splendour is alike, and more pleasing to some eyes, as in cloth of silver, silvered rapiers, &c. The main dignity is, that gold bears the fire, which silver doth not: but that is an excellency in nature, but it is nothing at all in use; for any dignity in use I know none, but that silvering will sully and canker more than gilding; which if it might be corrected with a little mixture of gold, there is profit: and I do somewhat marvel that the latter ages have lost the ancient *electrum*, which was a mixture of silver with gold: whereof I conceive there may be much use, both in coin, plate, and gilding.

It is to be noted, that there is in the version of metals impossibility, or at least great difficulty, as in making of gold, silver, copper. On the other side, in the adulterating or counterfeiting of metals, there is deceit and villainy. But it should seem there is a middle way, and that is by new compounds, if the ways of incorporating were well known.

What incorporation or imbibition metals will receive from vegetables, without being dissolved in their substance: as when the armourers make their steel more tough and pliant, by aspersion of water or juice of herbs; when gold being grown somewhat churlish by recovering, is made more pliant by throwing in shreds of tanned leather, or any leather oiled.

Note; that in these and the like shews of imbibition, it were good to try by the weights whether the weight be increased or no; for if it be not, it is to be doubted that there is no imbibition of substance, but only that the application of that other body doth dispose and invite the metal to another posture of parts than of itself it would have taken.

After the incorporation of metals by simple colliquefaction, for the better discovery of the nature and consents and dissents of metals, it would be likewise tried by incorporating of their dissolutions, [What metals being dissolved in strong waters

will incorporate well together, and what not? Which is to be enquired particularly, as it was in colliquefactions].[1]

There is to be observed in those dissolutions which will not easily incorporate, what the effects are: as the bullition; the precipitation to the bottom; the ejaculation towards the top; the suspension in the midst; and the like.

Note; that the dissents of the menstrual or strong waters may hinder the incorporation, as well as the dissents of the metals themselves; therefore where the *menstrua* are the same, and yet the incorporation followeth not, you may conclude the dissent is in the metals; but where the *menstrua* are several, not so certain.

Dr. Meverel's answers to the Lord Bacon's questions, concerning the compounding, incorporating, or union of metals and minerals.

Gold will incorporate with silver in any proportion. Plin. lib. xxxiii. cap. 4. "Omni auro inest argentum vario pondere; alibi dena, alibi nona, alibi octava parte — Ubicunque quinta argenti portio invenitur, electrum vocatur." The body remains fixed, solid, and coloured, according to the proportion of the two metals.

Gold with quicksilver easily mixeth, but the product is imperfectly fixed; and so are all other metals incorporate with mercury.

Gold incorporates with lead in any proportion.

Gold incorporates with copper in any proportion, the common allay.

Gold incorporates with brass in any proportion. And what is said of copper is true of brass, in the union of other metals.

Gold will not incorporate with iron.

Gold incorporates with tin, the ancient allay, Isa. I. 25.

What was said of gold and quicksilver, may be said of quicksilver and the rest of metals.

Silver with lead in any proportion.

Silver incorporates with copper. Pliny mentions such a mixture for triumphales statuæ, lib. xxxiii. 9. "Miscentur argento, tertia pars æris Cyprii tenuissimi, quod coronarium vocant, et sulphuris vivi quantum argenti." The same is true of brass.

Silver incorporates not with iron. Wherefore I wonder at that

[1] The words within brackets are not in the original as printed by Tenison. But a passage to the same effect occurs in Rawley's Latin translation of this piece, and I suppose that some one had inserted a translation of the passage (as necessary to complete the sense) in the margin of the copy which Blackbourne used: for Blackbourne inserts them as a separate paragraph.

which Pliny hath, lib. xxxiii. 9. "Miscuit denario triumvir Antonius ferrum." And what is said of this is true in the rest; for iron incorporateth with none of them.

Silver mixes with tin.

Lead incorporates with copper. Such a mixture was the pot-metal whereof Pliny speaks, lib. xxxiv. 9. "Ternis aut quaternis libris plumbi argentarii in centenas æris additis."

Lead incorporates with tin. The mixture of these two in equal proportions, is that which was anciently called "plumbum argentarium," Plin. lib. xxxiv. 17.

Copper incorporates with tin. Of such a mixture were the mirrors of the Romans. Plin. "Atque ut omnia de speculis peragantur hoc loco, optima apud majores erant Brundusina, stanno et ære mistis." Lib. lxxxiii. 9.

Compounded metals now in use.

1. Fine tin. The mixture is thus: pure tin a thousand pounds, temper fifty pounds, glass of tin three pounds.

2. Coarse pewter is made of fine tin and lead. Temper is thus made: the dross of pure tin, four pounds and a half; copper, half a pound.

3. Brass is made of copper and *calaminaris.*

4. Bell-metal. Copper, a thousand pounds; tin, from three hundred to two hundred pounds; brass, a hundred and fifty pounds.

5. Pot metal, copper and lead.

6. White alchemy is made of pan-brass one pound, and arsenicum three ounces.

7. Red alchemy is made of copper and auripigmen.

There be divers imperfect minerals, which will incorporate with the metals: being indeed metals inwardly, but clothed with earths and stones: as pyritis, calaminaris, mysi, chalcyti, sory, vitriolum.

Metals incorporate not with glass, except they be brought into the form of glass.

Metals dissolved. The dissolution of gold and silver disagree, so that in their mixture there is great ebullition, darkness, and in the end a precipitation of a black powder.

The mixture of gold and mercury agree.

Gold agrees with iron. In a word, the dissolution of mercury and iron agree with all the rest.

Silver and copper disagree, and so do silver and lead. Silver and tin agree.

The second letter of the cross-row, touching the separation of metals and minerals.

SEPARATION is of three sorts; the *first*, is the separating of the pure metal from the ore or dross, which we call refining. The *second*, is the drawing one metal or mineral out of another, which we call extracting. The *third*, is the separating of any metal into his original, or *materia prima*, or element, or call them what you will; which work we will call *principiation*.

For refining, we are to enquire of it according to the several metals; as gold, silver, &c. Incidently we are to enquire of the first stone or ore, or marcasite of metals severally, and what kind of bodies they are, and of the degrees of richness. Also we are to enquire of the means of separating, whether by fire, parting waters, or otherwise. Also for the manner of refining, you are to see how you can multiply the heat, or hasten the opening, and so save the charge in the fining.

The means of this in three manners; that is to say, in the blast of the fire; in the manner of the furnace, to multiply heat by union and reflexion; and by some additament, or medicines which will help the bodies to open them the sooner.

Note; the quickening of the blast, and the multiplying of the heat in the furnace, may be the same for all metals; but the additaments must be several, according to the nature of the metals. Note again, that if you think that [by] the multiplying of the additaments in the same proportion that you multiply the ore, the work will follow, you may be deceived: for quantity in the passive will add more resistance than the same quantity in the active will add force.

For extracting, you are to enquire what metals contain others, and likewise what not; as lead, silver; copper, silver, &c.

Note; although the charge of extraction should exceed the worth, yet that is not the matter. For at least it will discover nature and possibility, the other may be thought on afterwards.

We are likewise to enquire, what the differences are of those metals which contain more or less other metals, and how that agrees with the poorness or richness of the metals or ore in themselves. As the lead that contains most silver is accounted to be more brittle, and yet otherwise poorer in itself.

For *principiation*, I cannot affirm whether there be any such thing or not; and I think the chemists make too much ado about it; but howsoever it be, be it solution, or extraction, or a kind of conversion by the fire; it is diligently to be enquired what salts, sulphur, vitriol, mercury, or the like simple bodies are to be found in the several metals, and in what quantity.

Dr. Meverel's answers to the foregoing questions, touching the separations of metals and minerals.

1. For the *means of separating.* After that the ore is washed, or cleansed from the earth, there is nothing simply necessary, save only a wind furnace well framed, narrow above and at the hearth, in shape oval, sufficiently fed with charcoal and ore, in convenient proportions.

For additions in this first separation, I have observed none; the dross the mineral brings being sufficient. The refiners of iron observe, that that ironstone is hardest to melt which is fullest of metal, and that easiest which hath most dross. But in lead and tin the contrary is noted. Yet in melting of metals, when they have been calcined formerly by fire, or strong waters, there is good use of additaments, as of borax, tartar, armoniac, and salt-petre.

2. In *extracting of metals.* Note, that lead and tin contain silver. Lead and silver contain gold. Iron contains brass. Silver is best separated from lead by the test. So gold from silver. Yet the best way for that is *aqua regia.*

3. For *principiation.* I can truly and boldly affirm, that there are no such principles as sal, sulphur, and mercury, which can be separated from any perfect metals. For every part so separated, may easily be reduced into perfect metal without substitution of that, or those principles which chemists imagine to be wanting. As suppose you take the salt of lead; this salt, or as some name it, sulphur, may be turned into perfect lead, by melting it with the like quantity of lead which contains principles only for itself.

I acknowledge that there is quicksilver and brimstone found in the imperfect minerals; but those are nature's remote materials, and not the chemist's principles. As if you dissolve antimony by *aqua regia*, there will be real brimstone swimming upon the water: as appears by the colour of the fire when it is burnt, and by the smell.

The third letter of the cross-row, touching the variation of metals into several shapes, bodies, or natures, the particulars whereof follow.

Tincture.
Turning to rust.
Calcination.
Sublimation.
Precipitation.
Amalgamatizing, or turning into a soft body.
Vitrification.
Opening or dissolving into liquor.
Sproutings, or branchings, or arborescents.
Induration and mollification.
Making tough or brittle.
Volatility and fixation.
Transmutation, or version.

For *tincture;* it is to be enquired how metal may be tinged through and through, and with what, and into what colours; as tinging silver yellow, tinging copper white, and tinging red, green, blue; especially with keeping the lustre.

Item, tincture of glasses.

Item, tincture of marble, flint, or other stone.

For *turning into rust*, two things are chiefly to be enquired; by what corrosives[1] it is done, and into what colours it turns; as lead into white, which they call *cerus;* iron into yellow, which they call *crocus martis;* quicksilver into vermilion; brass into green, which they call verdigrease.

For *calcination;* how every metal is calcined, and into what kind of body, and what is the exquisitest way of calcination.

For *sublimation;* to enquire the manner of subliming, and what metals endure subliming, and what body the sublimate makes.

For *precipitation* likewise; by what strong water every metal will precipitate, and with what additaments, and in what time, and into what body.

So for *amalgama;* what metals will endure it, what are the means to do it, and what is the manner of the body.

For *vitrification* likewise; what metals will endure it, what are the means to do it, into what colour it turns, and further where the whole metal is turned into glass, and where the metal doth but hang in the glassy parts; also what weight the vitrified body bears, compared with the crude body; also because vitrification is accounted a kind of death of metals, what vitrification will admit of turning back again, and what not.

[1] *corasives* in orig.

For *dissolution* into liquor, we are to enquire what is the proper *menstruum* to dissolve any metal, and in the negative, what will touch upon the one and not upon the other, and what several *menstrua* will dissolve any metal, and which most exactly. *Item* the process or motion of the dissolution, the manner of rising, boiling, vapouring, more violent or more gentle, causing much heat or less. *Item* the quantity or charge that the strong water will bear, and then give over. *Item* the colour into which the liquor will turn. Above all it is to be enquired, whether there be any *menstruum* to dissolve any metal, that is not fretting or corroding, and openeth the body by sympathy, and not by mordacity or violent penetration.

For *sprouting or branching*, though it be a thing but transitory, and a kind of toy or pleasure, yet there is a more serious use of it; for that it discovereth the delicate motions of spirits, when they put forth and cannot get forth, like unto that which is in vegetables.

For *induration*, or mollification; it is to be enquired what will make metals harder and harder, and what will make them softer and softer. And this inquiry tendeth to two ends: first, for use; as to make iron soft by the fire makes it malleable. Secondly, because induration is a degree towards fixation, and mollification towards volatility; and therefore the inquiry of them will give light towards the other.

For *tough and brittle*, they are much of the same kind, but yet worthy of an inquiry apart, especially to join hardness with toughness, as making glass malleable, &c. and making blades strong to resist and pierce, and yet not easy to break.

For *volatility and fixation*. It is a principal branch to be enquired: the utmost degree of fixation is that whereon no fire will work, nor strong water joined with fire, if there be any such fixation possible. The next is, when fire simply will not work without strong waters. The next is by the test. The next is when it will endure fire not blown, or such a strength of fire. The next is when it will not endure, but yet is malleable. The next is when it is not malleable, but yet is not fluent, but stupified. So of volatility, the utmost degree is when it will fly away without returning. The next is when it will fly up, but with ease return. The next is when it will fly upwards over the helm[1] by a kind of exsufflation without

[1] So orig. Rawley translates it *supra caput*; and it is probably a mistake for *head*.

vapouring. The next is when it will melt though not rise. The next is when it will soften though not melt. Of all these diligent inquiry is to be made in several metals, especially of the more extreme degrees.

For *transmutation* or version. If it be real and true, it is the farthest part of art, and would be well distinguished from extraction, from restitution, and from adulteration. I hear much of turning iron into copper; I hear also of the growth of lead in weight, which cannot be without a conversion of some body into lead: but whatsoever is of this kind, and well expressed, is diligently to be enquired and set down.

Dr. Meverel's answers to the foregoing questions, concerning the variation of metals and minerals.

1. For *tinctures*, there are none that I know, but that rich variety which springs from mixture of metals with metals, or imperfect minerals.

2. The imperfect metals are subject to *rust*, all of them except mercury, which is made into vermilion by solution, or calcination. The rest are rusted by any salt, sour, or acid water. Lead into a white body called *cerussa*. Iron into a pale red called *ferrugo*. Copper is turned into green, named *ærugo*, *æs viride*. Tin into white: but this is not in use, neither hath it obtained a name.

The Scriptures mention the rust of gold, but that is in regard of the allay.

3. *Calcination*. All metals may be calcined by strong waters, or by admixtion of salt, sulphur, and mercury. The imperfect metals may be calcined by continuance of simple fire; iron thus calcined is called *crocus martis*.

And this is their best way. Gold and silver are best calcined by mercury. Their colour is grey. Lead calcined is very red. Copper dusky red.

4. Metals are *sublimed* by joining them with mercury or salts. As silver with mercury, gold with sal armoniac, mercury with vitriol.

5. *Precipitation* is, when any metal being dissolved into a strong water, is beaten down into a powder by salt water. The chiefest in this kind is oil of tartar.

6. *Amalgamation* is the joining or mixing of mercury with any other of the metals. The manner is this in gold, the rest are answerable: take six parts of mercury, make them hot in a crucible, and pour them to one part of gold made red-hot in another crucible, stir these well together that they may incorporate; which done, cast

the mass into cold water and wash it. This is called the amalgama of gold.

7. For *vitrification.* All the imperfect metals may be turned by strong fire into glass, except mercury; iron into green; lead into yellow; brass into blue; tin into pale yellow. For gold and silver, I have not known them vitrified, except joined with antimony. These glassy bodies may be reduced into the form of mineral bodies.

8. *Dissolution.* All metals without exception may be dissolved.

(1.) Iron may be dissolved by any tart, salt, or vitriolated water; yea, by common water, if it be first calcined with sulphur. It dissolves in *aqua forti,* with great ebullition and heat, into a red liquor, so red as blood.

(2.) Lead is fittest dissolved in vinegar, into a pale yellow, making the vinegar very sweet.

(3.) Tin is best dissolved with distilled salt water. It retains the colour of the *menstruum.*

(4.) Copper dissolves as iron doth, in the same liquor, into a blue.

(5.) Silver hath its proper *menstruum,* which is *aqua fortis.* The colour is green, with great heat and ebullition.

(6.) Gold is dissolved with *aqua regia,* into a yellow liquor, with little heat or ebullition.

(7.) Mercury is dissolved with much heat and boiling, into the same liquors which gold and silver are. It alters not the colour of the *menstruum.*

Note. Strong waters may be charged with half their weight of fixed metals, and equal of mercury; if the workman be skilful.

9. *Sprouting.* This is an accident of dissolution. For if the *menstruum* be overcharged, then within short time the metals will shoot into certain crystals.

10. For *induration,* or *mollification,* they depend upon the quantity of fixed mercury and sulphur. I have observed little of them, neither of toughness nor brittleness.

11. The *degrees of fixation* and *volatility* I acknowledge, except the two utmost, which never were observed.

12. The question of *transmutation* is very doubtful. Wherefore I refer your honour to the fourth tome of *Theatrum Chymicum:* and there, to that tract which is intitled *Disquisitio Heliana;* where you shall find full satisfaction.

The fourth letter of the cross-row, touching restitution.

First, therefore it is to be enquired in the negative, what bodies will never return, either by their extreme fixings, as in some vitrifications, or by extreme volatility.

It is also to be enquired of the two means of reduction; and first by the fire, which is but by congregation of homogeneal parts.

The second is, by drawing them down by some body that hath consent with them. As iron draweth down copper in water; gold draweth quicksilver in vapour; whatsoever is of this kind, is very diligently to be enquired.

Also it is to be enquired what time or age will reduce without help of fire or body.

Also it is to be enquired what gives impediment to union or restitution, which is sometimes called mortification; as when quicksilver is mortified with turpentine, spittle, or butter.

Lastly, it is to be enquired how the metal restored differeth in any thing from the metal rare[1]: as whether it become not more churlish, altered in colour, or the like.

Dr. Meverel's answers touching the restitutions of metals and minerals.

Reduction is chiefly effected by fire, wherein if they stand and nele, the imperfect metals vapour away, and so do all manner of salts which separated them *in minimas partes* before.

Reduction is singularly holpen by joining store of metal of the same nature with it in the melting.

Metals reduced are somewhat churlish, but not altered in colour.

[1] So orig. The translation has *crudo*.

THE LORD VERULAM'S INQUISITION CONCERNING THE VERSIONS, TRANSMUTATIONS, MULTIPLICATIONS, AND EFFECTIONS OF BODIES,

Written by him originally in English, though not hitherto published in that language.[1]

EARTH by fire is turned into brick, which is of the nature of a stone, and serveth for building, as stone doth: and the like of tile. *Qu. the manner.*

Naphtha, which was the bituminous mortar used in the walls of Babylon, grows to an entire and very hard matter like a stone.

In clay countries, where there is pebble and gravel, you shall find great stones, where you may see the pebbles or gravel, and between them a substance of stone as hard or harder than the pebble itself.

There are some springs of water, wherein if you put wood, it will turn into the nature of stone: so as that within the water shall be stone, and that above the water continue wood.

The slime about the reins and bladder in man's body, turns into stone: and stone is likewise found often in the gall; and sometimes, though rarely, in *venâ portâ*.

Quære, what time the substance of earth in quarries asketh to be turned into stone?

Water, as it seems, turneth into crystal, as is seen in divers caves, where the crystal hangs *in stillicidiis*.

Try wood, or the stalk of herbs, buried in quicksilver, whether it will not grow hard and stony.

They speak of a stone engendered in a toad's head.

There was a gentleman, digging in his moat, found an egg turned into stone, the white and the yolk keeping their colour, and the shell glistering like a stone cut with corners.

Try some things put into the bottom of a well; as wood, or some soft substance: but let it not touch the water, because it may not putrify.

They speak, that the white of an egg with lying long in the sun, will turn stone.

Mud in water turns into shells of fishes, as in horse-mussels, in fresh ponds, old and overgrown. And the substance is a wondrous fine substance, light and shining.

[1] Baconiana, p. 129.

CERTAIN EXPERIMENTS MADE BY THE LORD BACON ABOUT WEIGHT IN AIR AND WATER.[1]

A NEW sovereign of equal weight in the air to the piece in brass, overweigheth in the water nine grains: in three sovereigns the difference in the water is but twenty-four grains.

The same sovereign overweigheth an equal weight of lead, four grains in the water, in brass grains for gold: in three sovereigns about eleven grains.

The same sovereign overweigheth an equal weight of stones in the air, at least sixty-five grains in the water: the grains being for the weight of gold in brass metal.

A glass filled with water weighing, in Troy weights, thirteen ounces and five drams, the glass and the water together, weigheth severally, viz. the water nine ounces and a half, and the glass four ounces and a dram.

A bladder weighing two ounces seven drams and a half, a

[1] Baconiana, p. 134.

Bacon derived this method of weighing in air and water from Porta, who in his *Natural Magic* speaks of it as so great a thing as to entitle him to say ὑπερεύρηκα ὑπερεύρηκα; referring of course to the story of Archimedes. Of course it is possible to calculate specific gravities from experiments in which both scales of the balance are immersed in water; but Porta's rule for determining the amount of alloy contained in a piece of gold is altogether wrong, and how confused his notions were is shown by his directing the experimenter to immerse the scales *circiter semipedem*, as if the depth made any difference. So too Bacon speaks of immersing one of the scales five inches. Porta, a little further on, records some experiments made by immersing only one of the scales; and so we may observe does Bacon,—a circumstance which makes it plain that he was following Porta's directions. The notion of weighing in air and water was however not new. It is treated of at some length by Nicholas De Cusa. But Cusa's notions are at least as confused as Porta's. Thus he wants to determine not only the *pondus gravitatis*, but other kinds of *pondera;* and remarking that lead comes next to gold in *pondus gravitatis*—so that it would seem as if the comparative value of metals could not be determined by the balance—goes on to say that if we take account of the *pondus ignis*, then silver would, as it ought to do, come next. See Porta's *Natural Magic*, 18. chap. 8., and Cusa *de Staticis Experimentis*, appended to the edition of Vitruvius published at Strasbourg, 1550. (The tract is not paged.)

One of the first determinations of specific gravity results from Vitruvius's statement with respect to Mercury. He says "quum sint quatuor sextariorum mensuræ cum expenduntur invenientur esse pondo centum." Now the *congius* held, as we know, ten Roman pounds of water, and therefore the *sextarius* held five-thirds of a pound; four *sextarii* consequently of water would weigh six pounds and two-thirds; and comparing this with Vitruvius's statement, the specific gravity of quicksilver is fifteen,—a result sufficiently near the truth, but erring in excess.

It is worth remarking that Vitruvius in the passage I refer to gives the name of minium to cinnabar, not as commonly to red-lead. The name of vermillion must originally have belonged, as the etymology indicates, to kermes or cochineal. There is however a great deal of confusion in these names; and it would seem from Arrian that the name cinnabar was originally given to cochineal. There is a wonderful story of its being produced by a mixture of the blood of dragons and of elephants. See Vitruvius, book vii. chap. 8. — *R. L. E.*

pebble laid upon the top of the bladder makes three ounces six drams and a half, the stone weigheth seven drams.

The bladder (as above) blown, and the same fallen, weigheth equal.

A sponge dry weigheth one ounce twenty-six grains: the same sponge being wet, weigheth fourteen ounces six drams and three quarters: the water weigheth in several eleven ounces one dram and a half, and the sponge three ounces and a half and three quarters of a dram. *First time.*

The sponge and water together weigh fifteen ounces and seven drams: in several, the water weigheth eleven ounces and even drams, and the sponge three ounces seven drams and a half. *Second time.*

Three sovereigns made equal to a weight in silver in the air differ in the water.

For false weights, one beam long, the other thick.

The stick and thread weigh half a dram and twenty grains, being laid in the balance.

The stick tied to reach within half an inch of the end of the beam, and so much from the tongue, weigheth twenty-eight grains; the difference is twenty-two grains.

The same stick being tied to hang over the end of the beam an inch and a half, weigheth half a dram and twenty-four grains; exceeding the weight of the said stick in the balance by four grains.

The same stick being hanged down beneath the thread, as near the tongue as is possible, weigheth only eight grains.

Two weights of gold being made equal in the air, and weighing severally seven drams; the one balance being put into the water, and the other hanging in the air, the balance in the water weigheth only five drams and three grains, and abateth of the weight in the air, one dram and a half, and twenty-seven grains.

The same trial being made the second time, and more truly and exactly betwixt gold and gold, weighing severally (as above) and making a just and equal weight in the air, the one balance being put into the water the depth of five inches, and the other hanging in the air, the balance in the water weigheth only four drams and fifty-five grains, and abateth of the weight in the air two drams and five grains.

The trial being made betwixt lead and lead, weighing seve-

rally seven drams in the air, the balance in the water weigheth only four drams and forty-one grains, and abateth of the weight in the air two drams and nineteen grains; the balance kept the same depth in the water as abovesaid.

The trial being made betwixt silver and silver, weighing severally seven drams in the air, the balance in the water weigheth only four drams and twenty-five grains. So it abateth two drams and thirty-five grains; the same depth in the water observed.

In iron and iron, weighing severally each balance in the air seven drams, the balance in the water weigheth only four drams and eighteen grains; and abateth of the weight in the air two drams and forty-two grains; the depth observe as above.

In stone and stone, the same weight of seven drams equally in the air, the balance in the water weigheth only two drams and twenty-two grains; and abateth of the weight in the air four drams and thirty-eight grains; the depth as above.

In brass and brass, the same weight of seven drams in each balance, equal in the air, the balance in the water weigheth only four drams and twenty-two grains; and abateth in the water two drams and thirty-eight grains; the depth observed.

The two balances being weighed in air and water, the balance in the air over-weigheth the other in the water one dram and twenty-eight grains; the depth in the water as aforesaid.

It is a profitable experiment which sheweth the weights of several bodies in comparison with water. It is of use in lading of ships and other bottoms, and may help to shew what burden in the several kinds they will bear.

CERTAIN SUDDEN THOUGHTS OF THE LORD BACON'S, SET DOWN BY HIM UNDER THE TITLE OF EXPERIMENTS FOR PROFIT.[1]

Muck of leaves.

Muck of river, earth, and chalk.

Muck of earth closed, both for salt-petre and muck.

Setting of wheat and peas.

Mending of crops by steeping of seeds.

Making peas, cherries, and strawberries come early.

[1] Baconiana, p. 138.

Strengthening of earth for often returns of radishes, parsnips, turnips, &c.

Making great roots of onions, radishes, and other esculent roots.

Sowing of seeds of trefoil.

Setting of woad.

Setting of tobacco, and taking away the rawns.

Grafting upon boughs of old trees.

Making of a hasty coppice.

Planting of osiers in wet grounds.

Making of candles to last long.

Building of chimnies, furnaces, and ovens, to give heat with less wood.

Fixing of logwood.

Other means to make yellow and green fixed.

Conserving of oranges, lemons, citrons, pomegranates, &c. all summer.

Recovering of pearl, coral, turchoise colour, by a conservatory of snow.

Sowing of fennel.

Brewing with hay, haws, trefoil, broom, heps, brambleberries, woodbines, wild thyme, instead of hops, thistles.

Multiplying and dressing artichokes.

CERTAIN EXPERIMENTS OF THE LORD BACON'S, ABOUT THE COMMIXTURE OF LIQUORS ONLY, NOT SOLIDS, WITHOUT HEAT OR AGITATION, BUT ONLY BY SIMPLE COMPOSITION AND SETTLING.[1]

Spirit of wine mingled with common water, although it be much lighter than oil, yet so as if the first fall be broken by means of a sop or otherwise, it stayeth above; and if it be once mingled, it severeth not again, as oil doth. Tried with water coloured with saffron.

Spirit of wine mingled with common water hath a kind of clouding, and motion shewing no ready commixture. Tried with saffron.

A dram of gold dissolved in *aqua regis*, with a dram of copper in *aqua forti*, commixed, gave a green colour, but no visible motion in the parts. Note, that the dissolution of the gold was twelve parts water to one part body: and of the copper was six parts water to one part body.

Oil of almonds commixed with spirit of wine severeth, and the spirit of wine remaineth on the top, and the oil in the bottom.

[1] Baconiana, p. 140.

Gold dissolved, commixed with spirit of wine, a dram of each, doth commix, and no other apparent alteration.

Quicksilver dissolved with gold dissolved, a dram of each, doth turn to a mouldy liquor, black, and like smiths' water.

Note, the dissolution of the gold was twelve parts water, *ut suprà*, and one part metal: that of water was two parts, and one part metal.

Spirit of wine and quicksilver commixed, a dram of each, at the first shewed a white milky substance at the top, but soon after mingled.

Oil of vitriol commixed with oil of cloves, a dram of each, turneth into a red dark colour; and a substance thick, almost like pitch; and upon the first motion gathereth an extreme heat, not to be endured by touch.

Dissolution of gold, and oil of vitriol commixed, a dram of each, gathereth a great heat at the first, and darkeneth the gold, and maketh a thick yellow.

Spirit of wine and oil of vitriol, a dram of each, hardly mingle; the oil of vitriol going to the bottom, and the spirit of wine lying above in a milky substance. It gathereth also a great heat, and a sweetness in the taste.

Oil of vitriol and dissolution of quicksilver, a dram of each, maketh an extreme strife, and casteth up a very gross fume, and after casteth down a white kind of curds, or sands; and on the top a slimish substance, and gathereth a great heat.

Oil of sulphur and oil of cloves commixed, a dram of each, turn into a thick and red-coloured substance; but no such heat as appeared in the commixture with the oil of vitriol.

Oil of petroleum and spirit of wine, a dram of each, intermingle otherwise than by agitation, as wine and water do; and the petroleum remaineth on the top.

Oil of vitriol and petroleum, a dram of each, turn into a mouldy substance, and gathereth some warmth; there residing a black cloud in the bottom, and a monstrous thick oil on the top.

Spirit of wine and red-wine vinegar, one ounce of each, at the first fall one of them remaineth above, but by agitation they mingle.

Oil of vitriol and oil of almonds, one ounce of each, mingle not; but the oil of almonds remaineth above.

Spirit of wine and vinegar, an ounce of each, commixed, do mingle, without any apparent separation, which might be in respect of the colour.

Dissolution of iron, and oil of vitriol, a dram of each, do first put a milky substance into the bottom, and after incorporate into a mouldy substance.

Spirit of wine commixed with milk, a third part spirit of wine, and two parts milk, coagulateth little, but mingleth; and the spirit swims not above.

Milk and oil of almonds mingled, in equal portions, do hardly incorporate, but the oil cometh above, the milk being poured in last; and the milk appeareth in some drops or bubbles.

Milk one ounce, oil of vitriol a scruple, doth coagulate; the milk atthe bottom where the vitriol goeth.

Dissolution of gum tragacanth, and oil of sweet almonds, do not commingle, the oil remaining on the top till they be stirred, and make the mucilage [1] somewhat more liquid.

Dissolution of gum tragacanth one ounce and a half, with half an ounce of spirit of wine, being commixed by agitation, make the mucilage [1] more thick.

The white of an egg with spirit of wine, doth bake the egg into clots, as if it began to poch.

One ounce of blood, one ounce of milk, do easily incorporate.

Spirit of wine doth curdle the blood.

One ounce of whey unclarified, one ounce of oil of vitriol, make no apparent alteration.

One ounce of blood, one ounce of oil of almonds, incorporate not, but the oil swims above.

Three quarters of an ounce of wax being dissolved upon the fire, and one ounce of oil of almonds put together and stirred, do not so incorporate, but that when it is cold the wax gathereth and swims upon the top of the oil.

One ounce of oil of almonds cast into an ounce of sugar seething, sever presently, the sugar shooting towards the bottom.

A CATALOGUE OF BODIES ATTRACTIVE AND NOT ATTRACTIVE MADE BY THE LORD BACON,

TOGETHER WITH EXPERIMENTAL OBSERVATIONS ABOUT ATTRACTION.[2]

THESE following bodies *draw:*

Amber, jet, diamond, sapphire, carbuncle, iris, the gem. opale, amethyst, bristollina, crystal, clear glass, glass of antimony,

[1] *muselates* in the original.

[2] Baconiana, p. 145.

divers flowers from mines, sulphur, mastic, hard sealing-wax, the harder rosin, arsenic.

These following bodies *do not draw:*

Smaragd, achates, corneolus, pearl, jaspis, chalcedonius, alabaster, porphyry, coral, marble, touchstone, hæmatites or bloodstone, smyris, ivory, bones, ebon-tree, cedar, cypress, pitch, softer rosin, camphire, galbanum, ammoniac, storax, benjoin, loadstone[1], asphaltum.

These bodies, gold, silver, brass, iron, draw not, though never so finely polished.

In *winter*, if the air be sharp and clear, *sal gemmeum*, *rock alum*, and *lapis specularis*, will draw.

These following bodies are apt *to be drawn*, if the mass of them be small:

Chaff, woods, leaves, stones, all metals leaved, and in the mine; earth, water, oil.

Si fiat versorium ex metallo aliquo more Indicis Magnetici, et fini alteri apponatur succinum, leniter fricatum, versorium convertit se.

Succinum calefactum ab igne, sive tepeat, sive ferveat, sive inflammetur, non trahit.

Bacillum ferreum candens, flamma, candela ardens, carbo ignitus, admota festucis aut versoriis, non trahunt.

Succinum in majore mole, si fuerit politum, allicit, licet non fricatum; si in minore, aut impurius, sine frictione non trahit.

Crystallus, lapis specularis, vitrum, electrica cetera, si urantur, aut torreantur, non trahunt.

Pix.
Resina mollior.
Benjoin.
Asphaltum.
Camphora.
Galbanum.
Ammoniacum.
Storax.
Assa.

} Hæc cœlo calidiore neutiquam prorsus trahunt; at tempore frigidiore obscure et inferme trahunt.

Vapidus aër succino, &c. afflatus, vel ab ore, vel ab aëre humidiore, virtutem trahendi suffocat.

[1] A note in the margin says *the drawing of iron excepted.*

Si charta aut linteum interponatur inter succinum et paleam, not fit motus aut attractio.

Succinum aut electrica calefacta ex radiis solis, non expergefiunt ad trahendum, sicut ex frictione.

Succinum fricatum, et radiis solis expositum, diutius vires trahendi retinet, nec tam cito eas deponit ac si in umbra positum esset.

Fervor ex speculo comburente succino, &c. conciliatus, non juvat ad trahendum.

Sulphur accensum, et cera dura inflammata, non trahunt.

Succinum, cum citissime a frictione festucæ vel versorio apponitur, optime trahit.

Virtus electrica viget in retentione ad tempus non minus quam in attractione prima.

Flamma apposito succino intra orbem activitatis non trahitur.

Gutta aquæ admoto succino trahitur in conum. Electrica si durius affricentur, impeditur attractio.

Quæ ægre alliciunt in claro cœlo, in crasso non movent.

Aqua imposita succino virtutem trahendi suffocat, licet ipsam aquam trahat.

Sarca ita succino circundatum, ut tangat, attractionem tollit; sed interpositum ut non tangat, non omnino tollit.

Oleum succino appositum motum non impedit; nec succinum digito oleo madefacto fricatum, vires trahendi perdit.

Firmius provocant, et diutius retinent succinum, gagates, et hujusmodi, etiam minore cum frictione: adamas, crystallum, vitrum, diutius teri debent, ut manifesto incalescant antequam trahant.

Quæ flammæ approximant, licet propinqua distantia, a succino non trahuntur.

Fumum extincta lucerna succinum, &c. trahit. Fumus ubi exit et crassus est, fortius trahit succinum; cum ascenderit, et rarior fit, debilius. Corpus ab electricis attractum non manifesto alteratur, sed tantum incumbit.

MEDICAL REMAINS.

A Medical Paper of the Lord Bacon's, to which he gave the title of Grains of Youth.[1]

TAKE of nitre four grains, of ambergrease three grains, of orris-powder two grains, of white poppy-seed the fourth part of a grain, of saffron half a grain, with water of orange-flowers, and a little tragacanth; make them into small grains, four in number. To be taken at four a-clock, or going to bed.

Preserving ointments.

Take of deers-suet one ounce, of myrrh six grains, of saffron five grains, of bay-salt twelve grains, of Canary wine, of two years old, a spoonful and a half. Spread it on the inside of your shirt, and let it dry, and then put in on.

A purge familiar for opening the liver.

Take rhubarb two drams, agaric trochiscat one dram and a half, steep them in claret wine burnt with mace; take of worm-wood one dram, steep it with the rest, and make a mass of pills with *syrup. acetos.* simplex. But drink an opening broth before it, with succory, fennel, and smallage roots, and a little of an onion.

Wine for the spirits.

Take gold perfectly refined three ounces, quench it six or seven times in good claret wine; add of nitre six grains for two draughts; add of saffron prepared three grains, of ambergrease four grains, pass it through an hippocras bag, wherein there is a dram of cinnamon gross beaten, or, to avoid the dimming of the colour, of ginger. Take two spoonsful of this to a draught of fresh claret wine.

[1] Baconiana, p. 155.

The preparing of saffron.

Take six grains of saffron, steeped in half parts of wine and rose water, and a quarter part vinegar: then dry it in the sun.

Wine against adverse melancholy, preserving the senses and the reason.

Take the roots of bugloss well scraped, and cleansed from their inner pith, and cut them into small slices; steep them in wine of gold extinguished *ut suprà*, and add of nitre three grains, and drink it *ut suprà*, mixed with fresh wine: the roots must not continue steeped above a quarter of an hour; and they must be changed thrice.

Breakfast-preservative against the gout and rheums.

To take once in the month at least, and for two days together, one grain of *castorei* in my ordinary broth.

The preparation of garlick.

Take garlick four ounces, boil it upon a soft fire in claret wine, for half an hour. Take it out and steep it in vinegar; whereto add two drams of cloves, then take it forth, and keep it in a glass for use.

The artificial preparation of damask-roses, for smell.

Take roses, pull their leaves, then dry them in a clear day in the hot sun: then their smell will be as gone. Then cram them into an earthen bottle, very dry and sweet, and stop it very close; they will remain in smell and colour both, fresher than those that are otherwise dried. Note, the first drying, and close keeping upon it, preventeth all putrefaction, and the second spirit cometh forth, made of the remaining moisture not dissipated.

A restorative drink.

Take of Indian maiz half a pound, grind it not too small, but to the fineness of ordinary meal, and then bolt and serce it, that all the husky part may be taken away. Take of eryngium roots three ounces, of dates as much, of enula two

drams, of mace three drams, and brew them with ten-shilling beer to the quantity of four gallons: and this do, either by decocting them in a pottle of wort, to be after mingled with the beer, being new tapped, or otherwise infuse it in the new beer in a bag. Use this familiarly at meals.

Against the waste of the body by heat.

Take sweet pomegranates, and strain them lightly, not pressing the kernel, into a glass; where put some little of the peel of a citron, and two or three cloves, and three grains of ambergrease, and a pretty deal of fine sugar. It is to be drunk every morning whilst pomegranates last.

Methusalem Water. Against all asperity and torrefaction of inward parts, and all adustion of the blood, and generally against the dryness of age.

Take crevises very new, *q. s.* boil them well in claret wine, of them take only the shells, and rub them very clean, especially on the inside, that they be may thoroughly cleansed from the meat. Then wash them three or four times in fresh claret wine, heated; still changing the wine, till all the fish-taste be quite taken away. But in the wine wherein they are washed, steep some tops of green rosemary; then dry the pure shell thoroughly, and bring them to an exquisite powder. Of this powder take three drams. Take also pearl, and steep them in vinegar twelve hours, and dry off the vinegar; of this powder also three drams. Then put the shell powder and pearl powder together, and add to them of ginger one scruple, and of white poppy-seed half a scruple, and steep them in spirit of wine (wherein six grains of saffron have been dissolved) seven hours. Then upon a gentle heat vapour away all the spirit of wine, and dry the powder against the sun without fire. Add to it of nitre one dram, of ambergrease one scruple and a half; and so keep this powder for use in a clean glass. Then take a pottle of milk, and slice in it of fresh cucumbers, the inner pith only (the rind being pared off), four ounces, and draw forth a water by distillation. Take of claret wine a pint, and quench gold in it four times.

Of the wine, and of the water of milk, take of each three ounces, of the powder one scruple, and drink it in the morning; stir up the powder when you drink, and walk upon it.

A CATALOGUE OF ASTRINGENTS, OPENERS, AND CORDIALS, INSTRUMENTAL TO HEALTH.

Collected by Sir Francis Bacon, Baron of Verulam.[1]

ASTRINGENTS.

Red rose, black-berry, myrtle, plantane, flower of pomegranate, mint, aloes well washed, myrobalanes, sloes, agresta, fraga, mastich, myrrh, saffron, leaves of rosemary, rhubarb received by infusion, cloves, service-berries, corna, wormwood, bole armeniac, sealed earth, cinquefoil, tincture of steel, sanguis draconis, coral, amber, quinces, spikenard, galls, alum, blood-stone, mummy, amomum, galangal, cypress, ivy, psyllum, houseleek, sallow, mullein, vine, oak-leaves, lign-aloës, red sanders, mulberry, medlars, flowers of peach-trees, pomegranates, pears, palmule, pith of kernels, purslain, acacia, laudanum, tragacanth, thus olibani, comfrey, shepherds-purse, polygonium.

Astringents (both hot and cold) which corroborate the parts, and which confirm and refresh such of them as are loose or languishing.

Rosemary, mint, especially with vinegar, cloves, cinnamon, cardamom, lign-aloes, rose, myrtle, red sanders, cotonea, red wine, chalybeat-wine, five-finger grass, plantane, apples of cypress, berberries, fraga, service-berries, cornels, ribes, sour pears, rambesia.

Astringents styptic, which by their styptic virtue may stay fluxes.

Sloes, acacia, rind of pomegranates infused, at least three hours, the styptic virtue not coming forth in lesser time. Alum, galls, juice of sallow, syrup of unripe quinces, balaustia, the whites of eggs boiled hard in vinegar.

Astringents which by their cold and earthy nature may stay the motion of the humours tending to a flux.

Sealed earth, sanguis draconis, coral, pearls, the shell of the fish dactylus.

[1] Baconiana, p. 161.

Astringents which by the thickness of their substance stuff as it were the thin humours, and thereby stay fluxes.

Rice, beans, millet, cauls, dry cheese, fresh goats-milk.

Astringents which by virtue of their glutinous substance restrain a flux, and strengthen the looser parts.

Karabe [1], mastich, spodium, hartshorn, frankincense, dried bull's pistle, gum tragacanth.

Astringents purgative, which, having by their purgative or expulsive power thrust out the humours, leave behind them astrictive virtue.

Rhubarb, especially that which is toasted against the fire: myrobalanes, tartar, tamarinds, [an Indian fruit like green damasens.] [2]

Astringents which do very much suck and dry up the humours, and thereby stay fluxes.

Rust of iron, crocus martis, ashes of spices.

Astringents which by their nature do dull the spirits, and lay asleep the expulsive virtue, and take away the acrimony of all humours.

Laudanum, mithridate, diascordium, diacodium.

Astringents which, by cherishing the strength of the parts, do comfort and confirm their retentive power.

A stomacher of scarlet cloth. Whelps, or young healthy boys, applied to the stomach. Hippocratic wines, so they be made of austere materials.

OPENERS.

Succory, endive, betony, liverwort, petroselinum, smallage, asparagus, roots of grass, dodder, tamarisk, juncus odoratus, lacca, cupparus, wormwood, chamæpitys, fumaria, scurvy-grass, eringo, nettle, ireos, elder, hyssop, aristolochia, gentian, costus,

[1] Perhaps he meant the fruit of Karobe. — *Note by Tenison.*
[2] So bracketed in the original.

fennel-root, maiden-hair, harts-tongue, daffodilly, asarum, sarsaparilla, sassafras, acorns, abretonum, aloes, agaric, rhubarb infused, onions, garlic, bother, squilla, sow-bread, Indian nard, Celtic nard, bark of laurel-tree, bitter almonds, holy thistle, camomile, gun-powder, sows (millipedes), ammoniac, man's urine, rue, park leaves (vitex), centaury, lupines, chamædrys, costum, ammeas, bistort, camphire, daucus seed, Indian balsam, scordium, sweet cane, galingal, agrimony.

CORDIALS.

Flowers of basil royal, flores caryophillati, flowers of bugloss and borage, rind of citron, orange flowers, rosemary and its flowers, saffron, musk, amber, folium [i. e. nardi folium], balm-gentle, pimpernel, gems, gold, generous wines, fragrant apples, rose, rosa moschata, cloves, lign-aloes, mace, cinnamon, nutmeg, cardamom, galingal, vinegar, kermes-berry, herba moschata, betony, white sanders, camphire, flowers of heliotrope, penny-royal, scordium, opium corrected, white pepper, nasturtium, white and red bean, castum dulce, dactylus, pine, fig, egg-shell, vinum malvaticum, ginger, kidneys, oysters, crevises (or river crabs), seed of nettle, oil of sweet almonds, sesamium oleum, asparagus, bulbous roots, onions, garlick, eruca, daucus seed, eringo, siler montanus, the smell of musk, cynethi odor, caraway seed, flower of puls, aniseed, pellitory, anointing of the testicles with oil of elder in which pellitory hath been boiled, cloves with goats milk, olibanum.

An extract by the Lord Bacon, for his own use, out of the book of the prolongation of life, together with some new advices in order to health.[1]

1. Once in the week, or at least in the fortnight, to take the water of mithridate distilled, with three parts to one, or strawberry-water to allay it; and some grains of nitre and saffron, in the morning between sleeps.

2. To continue my broth with nitre; but to interchange it every other two days, with the juice of pomegranates expressed, with a little cloves, and rind of citron.

[1] Baconiana, p. 167.

3. To order the taking of the maceration[1] as followeth.

To add to the maceration six grains of cremor tartari, and as much enula.

To add to the oxymel some infusion of fennel-roots in the vinegar, and four grains of angelica-seed, and juice of lemons, a third part to the vinegar.

To take it not so immediately before supper, and to have the broth specially made with barley, rosemary, thyme, and cresses.

[Sometimes to add to the maceration three grains of tartar, and two of enula, to cut the more heavy and viscous humours; lest rhubarb work only upon the lightest.

To take sometimes the oxymel before it, and sometimes the Spanish honey simple.][2]

4. To take once in the month at least, and for two days together, a grain and a half of castor in my broth, and breakfast.

5. A cooling clyster to be used once a month, after the working of the maceration is settled.

Take of barley-water, in which the roots of bugloss are boiled, three ounces, with two drams of red sanders, and two ounces of raisins of the sun, and one ounce of dactyles, and an ounce and a half of fat caricks; let it be strained, and add to it an ounce and a half of syrup of violets: let a clyster be made. Let this be taken (with veal) in the aforesaid decoction.

6. To take every morning the fume of lign-aloes, rosemary and bays dried, which I use; but once in a week to add a little tobacco, without otherwise taking it in a pipe.

7. To appoint every day an hour *ad affectus intentionales et sanos. Qu. de particulari.*

8. To remember masticatories for the mouth.

9. And orange-flower water to be smelt to or snuffed up.

10. In the third hour after the sun is risen, to take in air from some high and open place, with a ventilation of rosæ moschatæ, and fresh violets; and to stir the earth, with infusion of wine and mint.

[1] Viz. of rhubarb infused into a draught of white wine and beer, mingled together for the space of half an hour, once in six or seven days. See the Lord Bacon's Life, by Dr. Rawley, towards the end.—*Note by Tenison.*

[2] These two paragraphs are inserted in Blackbourne's edition as part of the paper; but they are not in the *Baconiana*, nor do I know where he got them.

11. To use ale with a little enula campana, carduus, germander, sage, angelica-seed, cresses of a middle age, to beget a robust heat.

12. Mithridate thrice a year.

13. A bit of bread dipt in vino odorato, with syrup of dry roses, and a little amber, at going to bed.

14. Never to keep the body in the same posture above half an hour at a time.

15. Four precepts. To break off custom. To shake off spirits ill disposed. To meditate on youth. To do nothing against a man's genius.

16. Syrup of quinces for the mouth of the stomach. Enquire concerning other things useful in that kind.

17. To use once during supper time wine in which gold is quenched.

18. To use anointing in the morning lightly with oil of almonds, with salt and saffron, and a gentle rubbing.

19. Ale of the second infusion of the vine of oak.

20. Methusalem water, of pearls and shells, of crabs, and a little chalk.

21. Ale of raisins, dactyles, potatoes, pistachios, honey, tragacanth, mastic.

22. Wine with swines-flesh or harts-flesh.

23. To drink the first cup at supper hot, and half an hour before supper something hot and aromatised.

24. Chalybeats four times a year.

25. Pilulæ ex tribus, once in two months, but after the mass has been macerated in oil of almonds.

26. Heroic desires.

27. Bathing of the feet once in a month, with lie ex sale nigro, camomile, sweet marjoram, fennel, sage, and a little aqua vitæ.

28. To provide always an apt breakfast.

29. To beat the flesh before roasting of it.

30. Macerations in pickles.

31. Agitation of beer by ropes, or in wheel-barrows.

32. That diet is good which makes lean, and then renews. Consider of the ways to effect it.

MEDICAL RECEIPTS OF THE LORD BACON'S.

The first receipt, or his Lordship's broth and fomentation for the stone.

The broth.

TAKE one dram of eryngium roots, cleansed and slieed; and boil them together with a chieken. In the end, add of elder flowers, and marigold flowers together, one pugil; of angelica seed half a dram, of raisins of the sun stoned, fifteen; of rosemary, thyme, mace, together, a little.

In six ounees of this broth or thereabouts, let there be dissolved of white cremor tartari three grains.

Every third or fourth day, take a small toast of manchet, dipped in oil of sweet almonds new drawn, and sprinkled with a little loaf-sugar.

You may make the broth for two days, and take the one half every day.

If you find the stone to stir, forbear the toast for a course or two.

The intention of this broth is not to void, but to undermine the quarry of the stones in the kidneys.

The fomentation.

Take of leaves of violets, mallows, pellitory of the wall, together, one handful; of flowers of camomile and mellilot, together, one pugil; the root of marshmallows, one ounce; of anise and fennel seeds, together, one ounee and a half; of flaxseed two drams. Make a decoction in spring water.

The second receipt, shewing the way of making a certain ointment, which his Lordship called Unguentum fragrans, sive Romanum, the fragrant or Roman unguent.

Take of the fat of a deer half a pound; of oil of sweet almonds two ounees: let them be set upon a very gentle fire, and stirred with a stick of juniper till they are melted.

Add of root of flower-de-luee powdered, damask roses powdered, together, one dram; of myrrh dissolved in rose-water

half a dram; of cloves half a scruple; of civet four grains; of musk six grains; of oil of mace expressed one drop; as much of rose-water as sufficeth to keep the unguent from being too thick.

Let all these be put together in a glass, and set upon the embers for the space of an hour, and stirred with a stick of juniper.

Note, that in the confection of this ointment, there was not used above a quarter of a pound, and a tenth part of a quarter of deer's suet: and that all the ingredients, except the oil of almonds, were doubled when the ointment was half made, because the fat things seemed to be too predominant.

The third receipt. A Manus Christi for the stomach.

Take of the best pearls very finely pulverised, one dram; of sal nitre one scruple; of tartar two scruples; of ginger and galingal together, one ounce and a half; of calamus, root of enula campana, nutmeg, together, one scruple and a half; of amber sixteen grains; of the best musk ten grains; with rose-water and the finest sugar, let there be made a Manus Christi.

The fourth receipt. A secret for the stomach.

Take lignum aloës in gross shavings, steep them in sack, or alicant, changed twice, half an hour at a time, till the bitterness be drawn forth. Then take the shavings forth, and dry them in the shade, and beat them to an excellent powder. Of that powder, with the syrup of citrons, make a small pill, to be taken before supper.

END OF THE THIRD VOLUME.

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12

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